UK Government

RAF010/2425: Unlooping Electricity Network Connections Research

Summary report

DESNZ / Eunomia Research and Consulting (2026)

Acknowledgements

DESNZ extends its sincere thanks to the team at Eunomia Research and Consulting, with special appreciation to the Project Manager Laura Williams, for delivering an outstanding piece of research.

Eunomia Research and Consulting would like to thank the Distribution Network Operators, Installers and trade associations who participated in this research. A full list of those who participated can be found in the appendix. We also thank the Energy Infrastructure & Markets Analysis team at DESNZ for their valuable input and feedback throughout the study.

Contents

Executive summary

This research provides an in-depth analysis of looped electricity connections in Great Britain (GB) and their implications for the transition to a Net Zero economy.

A looped connection[1] is a type of electrical setup where two or more properties share a single electricity service cable from the main network. Each property on the supply has their electricity supply 'looped' to their neighbours, forming a loop. There are typically 2-6 properties per loop, although they can extend to more homes. Homes are looped in this way as it is a simpler and more cost-efficient way to connect properties to the grid. While there are some common trends across Distribution Network Operator (DNO) regions in terms of the types of properties or scenarios where looped connections were used, such connections do not follow a single, uniform pattern.

As households adopt low-carbon technologies (LCTs) such as heat pumps and electric vehicles (EVs) to meet the UK's Net Zero targets, the capacity of existing electricity connections becomes increasingly important. Looped connections mean that multiple properties share a single service cable, which can constrain the available electrical capacity. This can limit the speed of LCT adoption, as additional upgrade works may be required to provide sufficient capacity. Unlooping[2] is often necessary. This involves removing the shared cable setup and installing a new cable directly from the main network to each property. However, this can be costly and time-consuming, slowing down the transition to low-carbon homes and adding complexity to the process.

This report draws on insights from a broad range of industry stakeholders, including Distribution Network Operators (DNOs), installers, trade associations, Ofgem, and consumers. A combination of a rapid evidence assessment and stakeholder engagement was conducted to assess the scale of the issue, explore potential solutions, and recommend next steps.

It is estimated that 11-17% of Great Britain's (GB) housing stock (3.1 - 4.7 million homes) may be affected by looped connections. Whilst projected unlooping rates may constrain LCT uptake, the overall impact of looped connections remains uncertain due to several key factors:

- **Data gaps & inconsistent records:** DNOs have inconsistent records on the prevalence and location of looped connections, making it difficult to assess the full scale of the issue.
- **Policy & consumer demand uncertainty:** Future government incentives and policies will shape LCT adoption rates, but consumer-driven demand could also accelerate or slow unlooping efforts.

[1] The term 'looped connection' is also commonly referred to as 'looped service'
[2] The term 'unlooping' is also commonly referred to as 'delooping'

- **Funding & budget constraints:** The RIIO-ED3 regulatory settlement (2028–2033) will determine available funding for network upgrades, including unlooping. Limited data suggests that progress will vary across DNOs, making national projections uncertain.
- **Workforce & resource limitations:** A shortage of skilled professionals, including lines people, Senior Authorised Persons (SAPs), jointers, and legal/admin staff, could create operational bottlenecks. Internal competition for skilled workers within DNOs may further slow unlooping efforts.

Findings suggest that looped connections present a complex and evolving challenge, and they could slow the rollout of LCTs, particularly for social housing projects, where additional coordination between stakeholders is required. In some cases, delays caused by looped connections is preventing effective uptake of government funding designed to support LCT adoption. It was reported that applications for funding were deliberately foregone, as the time taken for unlooping to occur would exceed the maximum time permitted to spend said funding.

Currently, DNOs take different approaches to unlooping. Some reactively unloop only when a consumer request to connect an LCT is made, while others are beginning to proactively unloop connections ahead of anticipated demand. Proactive unlooping may help mitigate issues such as potential neighbour disputes, though its success varies between the two DNOs currently implementing such programs.

Insights from the survey with households revealed a lack of understanding of looped connections and the unlooping process, leading to concerns about disruption and hesitancy toward LCT adoption. However, those who have undergone unlooping tend to have a more positive outlook and had high levels of satisfaction with the overall process.

To effectively limit the impact of looped connections and facilitate the widespread adoption of LCTs, the following actions are suggested for consideration:

- Further investigation into problem identification is key to fully understand the true scale and impact of the issue.
- Strategic funding mechanisms could be established to incentivise proactive unlooping efforts, ensuring a more efficient and effective approach.
- Standardisation and enhancement of the unlooping process are key to provide a seamless experience for consumers and to prevent potential bottlenecks during implementation.
- Addressing workforce shortages in critical roles to scale up unlooping activities and avoid future constraints on efforts.
- Consumer engagement and education are vital for improving the process itself, fostering greater understanding, and promoting wider acceptance of unlooping initiatives.
- A dedicated cross industry working group to actively lead and coordinate efforts on unlooping, ensuring a structured approach across multiple workstreams.

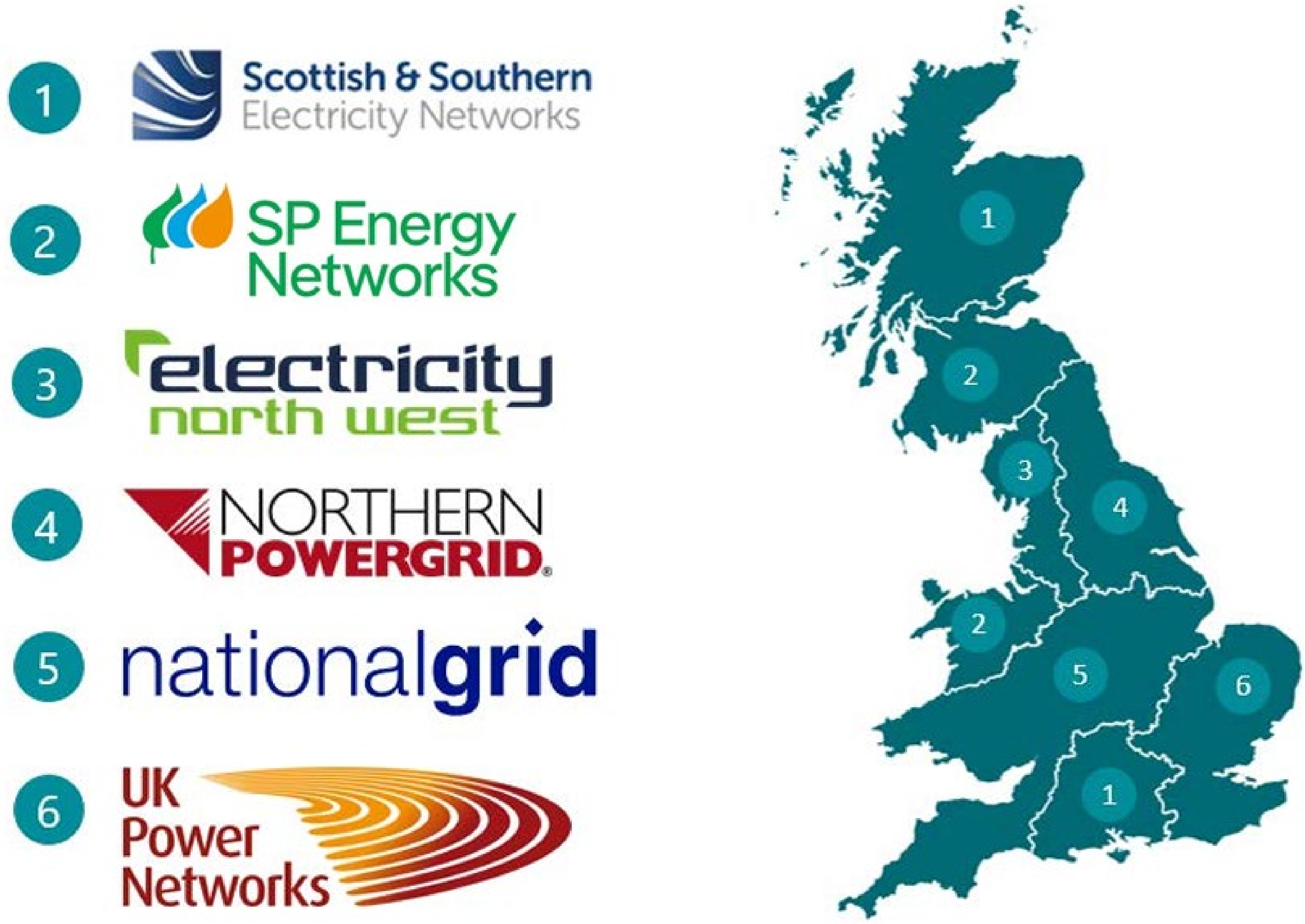
Glossary

Acronym	Meaning
Battery Energy Storage System (BESS)	A BESS stores electricity, often from Solar PV, for later use. It can help manage peak demand and reduce reliance on the grid.
Current Transformer (CT) Clamp	A device that monitors the current passing through a service cable. It is often used in smart energy management systems to measure electricity usage and can help regulate demand in homes and specific appliances.
Cut-out	A piece of electrical equipment housing the main fuse, which connects the mains electricity via a service cable to the internal wiring in a property,
Delooping	A synonymous term for unlooping
Distribution Network Operators (DNOs)	**DNOs are the companies responsible for managing and maintaining the local electricity distribution network and supplying power to homes.** Figure 1 is a map that shows the operational regions of each DNO across GB.
Electricity Network Association (ENA)	The UK trade association representing electricity network operators, including DNOs. It supports industry standards and policies related to network upgrades.
Electricity North West Limited (ENWL)	ENWL is the DNO responsible for distributing electricity in the North West of England.
Electric Vehicle (EV)	An EV is a vehicle powered by electricity, often requiring home charging infrastructure.
Electric Vehicle Charging Point (EVCP)	An EVCP is a device that supplies electric energy for charging EVs.
Guaranteed Standards of Performance (GSoP)	GSoPs are regulatory standards outlining service expectations for DNOs. Currently, GSoPs do not apply to certain network upgrades, leading to variability in response times.

Acronym	Meaning
Heat Pump (HP)	A heat pump transfers heat from outside a property to heat water (usually in a water tank), which is then used to provide heat and hot water within a property. They are powered by electricity.
Lines Worker	A tradesperson who installs, maintains, and repairs outdoor electrical equipment for electricity distribution and transmission, such as overhead lines and transformers.
Load Related Expenditure (LRE)	LRE refers to investment in electricity network infrastructure to accommodate changes in demand, such as the increased uptake of Low Carbon Technologies (LCTs). Under the RIIO-ED2 price control framework, Ofgem funds these works via an uncertainty mechanism to ensure flexibility in addressing evolving network needs.
Low Carbon Technology (LCT)	LCTs such as EVs, heat pumps, and solar panels that reduce carbon emissions in households.
National Grid Electricity Distribution (NGED)	NGED is the DNO responsible for electricity distribution in the Midlands, South West, and South Wales
Northern Powergrid (NPG)	NPG is the DNO covering the North East, Yorkshire, and northern Lincolnshire.
RIIO-ED2 / ED3	RIIO-ED2 is a regulatory framework set by Ofgem (the UK's energy regulator) for electricity distribution companies. It stands for Revenue = Incentives + Innovation + Outputs, a framework designed to ensure network companies provide reliable and sustainable services at fair costs. ED2 refers to the second Electricity Distribution price control period, covering 2023–2028, ED3 runs from 2028 to 2033.
Scottish Power Energy Networks (SPEN)	SPEN is the DNO responsible for Central & Southern Scotland, North Wales, and Merseyside.
Scottish and Southern Electricity Networks (SSEN)	SSEN is the DNO covering northern Scotland and central southern England.
Senior Authorised Person (SAP)	SAP level contractors are qualified engineers authorised to carry out and oversee high-voltage (HV) and low-voltage (LV) electrical work, including network upgrades.

Acronym	Meaning
Solar Photovoltaics (PV)	Solar PV is a technology that converts sunlight into electricity. At home, it can generate power for immediate use, store excess energy in a battery, or export it to the grid.
UK Power Networks (UKPN)	UKPN is the DNO serving London, the South East, and the East of England.

Figure 1: A map showing DNO licence areas across Great Britain[3]



[3] Regen (2023) Networks Unlocked. Available at: www.regen.co.uk/wp-content/uploads/Regen-SP-Energy-Networks-Networks-Unlocked-2.pdf

Introduction

In September 2024, the Department for Energy Security and Net Zero (DESNZ) commissioned Eunomia Research and Consulting to undertake research into the number of looped connections and potential solutions to overcome associated challenges.

Research background

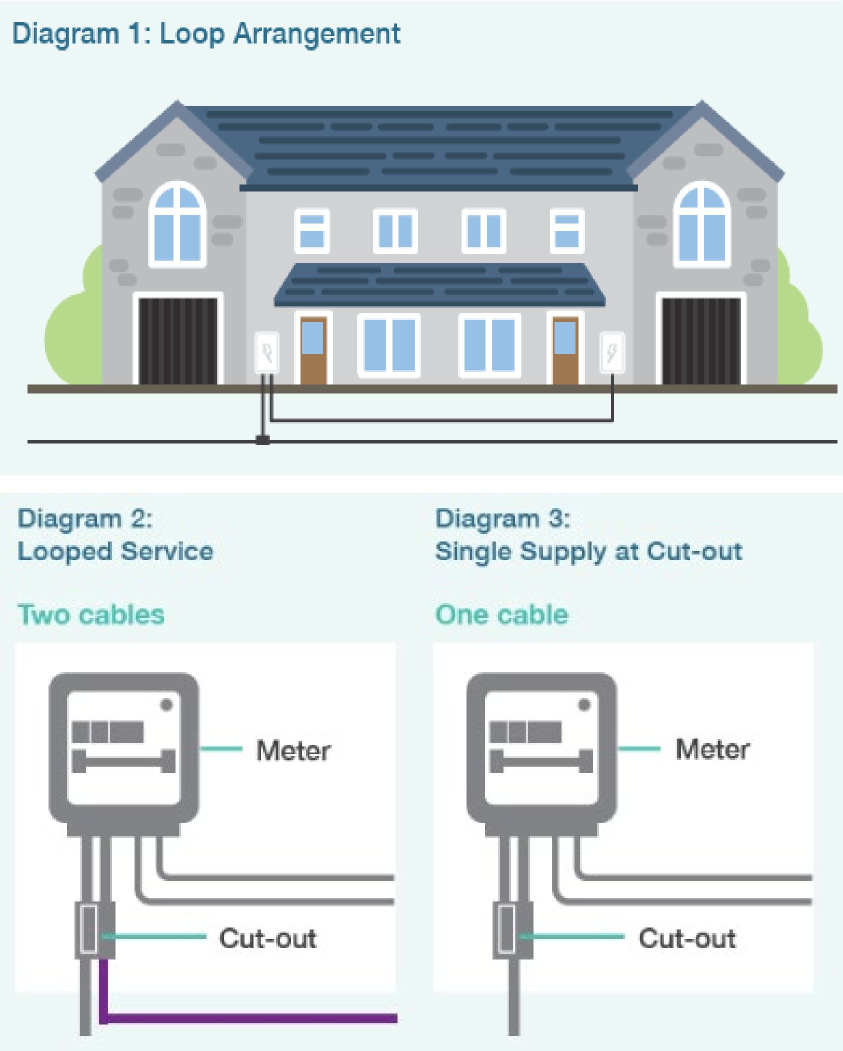
The United Kingdom (UK) has set a legally binding Net Zero target for 2050, with household electrification playing a crucial role in achieving this goal. The previous government's Heat and Buildings Strategy aimed to significantly reduce carbon emissions from the UK's 30 million homes and workplaces by encouraging the adoption of low carbon technologies (LCTs) such as electric vehicles (EVs) and heat pumps.[4] As the use of electricity for heating and transport increases, electricity is expected to provide around half of the final energy demand.[5]

Traditionally, households have met their energy needs through four primary sources: electricity, gas, oil, and fuels such as petrol and diesel. As part of the transition to Net Zero, the future is shifting towards electricity becoming the primary source of energy for homes, therefore careful planning of electricity network upgrades is essential. With the rise in domestic electricity usage, it is clear that the current infrastructure was not designed to handle the increased demand for service connections at a household level. Distribution Network Operators (DNOs) must address this issue to ensure the network can support both the growing demand and the shift to cleaner energy sources.

A significant challenge in facilitating this transition is the presence of looped connections in many households, which may hinder the adoption of LCTs. A looped connection, also known as a looped service, is a type of electrical setup where two or more properties share a single electricity service cable from the distribution network (see Figure 2). This limits the amount of current that can be drawn by each individual property. This reduced capacity makes it difficult for homes with looped connections to support the increased electrical demand from LCTs.

[4] Department for Business, Energy and Industrial Strategy (2019) 'Heat and buildings strategy', GOV.UK. Available at: www.gov.uk/government/publications/heat-and-buildings-strategy
[5] Department for Business, Energy and Industrial Strategy (2020) 'Modelling 2050: Electricity system analysis', GOV.UK. Available at: www.gov.uk/government/publications/modelling-2050-electricity-system-analysis

Figure 2: Diagrams showing how a looped household is connected to the mains electricity supply



Source: Identifying Looped Services – National Grid

One of the key factors contributing to the challenge is the maximum fuse rating in each household's electricity cut-out[6], which typically ranges from 60A to 100A. Chargers for EVs require up to 32A (7kW) for a single-phase supply. However, in the rare cases where a three-phase supply is installed, chargers can provide up to 22kW, which would typically require around 32A per phase.[7] While heat pumps generally demand less, typically ranging between 16A (4kW) and 32A (8kW), depending on the property's heating needs.[8] It is worth highlighting that in reality and during operation, the heat pump is almost never going to draw the full power. This is because the actual demand is often lower than the maximum specified, especially if the system doesn't rely on backup resistance heating, which is sometimes assumed in energy databases.

[6] The 'cut out' is a piece of electrical equipment housing the main fuse, which connects the mains electricity via a service cable to the internal wiring in a property.
[7] Office for Zero Emission Vehicles (2023) 'Residential Chargepoints: Minimum Technical Specification', GOV.UK. Available at: www.gov.uk/guidance/residential-chargepoints-minimum-technical-specification
[8] Heat Pump UK Grants & Funding (2024) 'What Size Air Source Heat Pump Do I Need for My Home?' Available at: https://heat-pumps.org.uk/what-size-air-source-heat-pump-do-i-need-for-my-home/

If a household with a looped connection installs an EV charging point (EVCP) or a heat pump, the risk of exceeding the maximum demand increases. This is because the additional load from these high-energy appliances places greater demand on the shared service cable, which has a limited capacity. As the number of houses and the total load on the looped system increases, the available current per house decreases, making it more likely that the combined demand could exceed the capacity of the service cable and the fuse in the first house.

The fuse in the first house of a looped supply effectively sets an upper limit to the total current available to all houses on that loop. While it might seem that this current is simply divided between the connected properties, for example a 60A fuse shared between two houses providing 30A each, does not reflect how electrical loads on a looped supply are shared in practice. In reality, properties on a looped connection can have very different load profiles. One house may use high-demand electrical appliances such as an EV charger, heat pump, electric shower, tumble dryer, oven, microwave, hoover, kettle, blender, or even a home spa, while another may not use some of these appliances. Because of these differences, the current is not shared equally between properties. Furthermore, not all properties will use their maximum electrical load at the same time. Each property has its own main fuse (typically 60A, 80A, or 100A), which sets the maximum amount of electricity that can flow into that property individually. Even though each property can technically draw up to its own fuse limit, the shared network may not be able to support all properties doing so simultaneously, especially as more homes begin using appliances that place a greater demand on the electrical supply.

If not effectively managed, looped services can significantly impact the reliability of electricity supply to connected properties and the broader distribution network. When the total demand exceeds the fuse rating of the loop for a sustained period, the fuse should eventually blow, cutting off the supply. However, before this happens, network assets, such as cables, joints, and connectors, may be exposed to sustained high currents, leading to overheating, thermal degradation, and increased wear and tear.

Given the rising demand from LCTs,[9] looped connections may no longer be suitable, necessitating upgrades to individual service connections, as cut-out fuses and service cables may not be sufficient to support the total load across the looped properties.

The primary solution to managing looped connections and accommodating increasing electricity demand is **unlooping**. This process involves disconnecting the shared cable and installing a new service cable to provide an independent supply to each property, often upgrading the cut-out to 80A or 100A fuses. However, unlooping typically requires excavation work, which can be disruptive. Although DNOs generally cover the cost, the lack of regulatory standards means timelines and service levels can vary.

To address this issue, DNOs typically reclaim the costs of unlooping through electricity bills, as they do not charge individual householders for the service. Under the RIIO-ED2 price control framework, Ofgem funds these works via an uncertainty mechanism within Load Related Expenditure (LRE). Since unlooping is a largely reactive service, DNOs' allowances adjust

[9] And other electrical household appliances in a high electrification scenario, for example electric showers 7-10kW, a four-zone induction hob can use up to 7 - 12 kW in total when all zones are in use.

based on the volume of work completed, rather than being set at a fixed amount. Ofgem has established an industry median unit cost of £1,900 per property, derived from DNO submissions, although actual costs can vary. DNOs are engaging or preparing to engage with Ofgem on these volume driver unit costs to reflect changing market conditions, and they may need to re-evaluate their unlooping programs following this.

Research aims and objectives

The primary focus of this study was on **DNOs**, who are responsible for distributing electricity to homes and businesses across GB. While Independent Distribution Network Operators (IDNOs) also manage local networks, their relevance to the issue of looped connections is minimal due to the newer infrastructure they oversee. Furthermore, the number of connections they manage is a small fraction of the total. This study specifically concentrated on residential households, excluding commercial properties, to narrow the scope and ensure the most relevant impact analysis for domestic consumers.

Considering the UK's transition to a Net Zero economy, particular attention was given to the rising prevalence of **Low Carbon Technologies (LCTs), such as EVs and heat pumps**, which are expected to be the main devices impacted by looped connections. These technologies are central to decarbonising residential heating and transport, making their uptake crucial for achieving carbon reduction goals. While solar PV and battery energy storage systems (BESS) can also affect household loading, they typically do not affect power flows through looped services to the same extent, which is why they were not the main focus of the analysis.

The aim of this research is to build an evidence base to better understand the issues posed by looped connections, identify the solutions and test these with households. The research sought to:

- Quantify the number and distribution of looped connections in GB and the characteristics of affected households.
- Assess whether the projected rate of unlooping will hinder the rollout of domestic heat pumps and EVs.
- Provide an overview of policy, technological, and innovative solutions to address the problem of looped connections.
- Investigate consumer attitudes towards looped connections and unlooping.

Given the complexity of the issue, a mixed-methods approach was used, engaging with key stakeholders such as DNOs, LCT installers, households, trade associations, housing associations, and Ofgem. By synthesising primary and secondary evidence, a robust assessment of looped connections is presented to support future policy development.

Methodology

The research methodology was designed to be adaptable and future-proof, enabling potential repeat studies to ensure the findings remain relevant as the UK progresses toward its Net Zero target. Additionally, recognising the limited availability of precise data, all estimates made were transparent, based on robust evidence, and any uncertainties were outlined.

To answer the four overarching research questions (set out in Section 'Research aims and objectives') the methodology below was employed:

Industry data collection

Task 1 – Rapid Evidence Assessment (REA):

A REA (of industry reports, consumer forums and DNO engineering justification papers) built an evidence base across the four research questions and informed question design for Tasks 4, 6 and 7.

Task 2 & Task 3 – DNO scoping interviews and data request:

Scoping interviews of 15-30 minutes were carried out with the six DNOs and aimed to: provide the DNOs with a research overview; and gather insights into current strategies and plans for unlooping. A data request on the four research questions was subsequently shared with the DNOs. Interviews and data request findings were synthesised to identify key themes, challenges, and solutions to unlooping. The synthesis informed Tasks 4, 6 and 7 and was a basis for Task 5.

Task 4 – Qualitative interviews:

In-depth interviews collected data on the four research questions, which was then thematically analysed. Twenty-two semi-structured interviews were carried out across eight stakeholder groups representing the LCT sector:

- DNOs
- Independent DNOs
- Housing and landlord associations
- Trade associations
- Regulators
- Heat pump and EVCP installers; and
- Heat pump manufacturers

Task 5 – Analysis:

Using data from Tasks 1 – 4, findings were analysed and triangulated to: quantify looped connections; provide an overview of policy, technological and innovative solutions to the unlooping problem; estimate the projected rate of unlooping and the impacts on LCT deployment.

Household data collection

Task 6 - Consumer attitude and observations focus groups:

Building on Task 1 and 4, two virtual focus groups were held to capture a range of consumer perspectives on looped connections and unlooping. The focus groups were broken down into (1) households with unlooped properties and (2) general households with looped or unlooped connections. The findings were analysed thematically and informed Task 7.

Task 7- Consumer attitudes survey:

A quantitative survey investigated consumer attitudes towards looped connections and unlooping across households in GB. The survey applied a stratified sampling approach using a non-probabilistic consumer panel to ensure representativeness of multiple demographics. 1,007 responses were received (73 who had been unlooped – where observations were gathered) and analysed using descriptive statistics, tabulation, and cross-tabulation analysis.

Reporting:

These findings were compiled into a draft summary report and supporting technical annex. This was finalised following feedback from DESNZ and then a final presentation to the wider DESNZ team was carried out.

Key findings

The research is structured around two key themes: understanding the scale and nature of the issue and exploring potential solutions. First, the study examines the prevalence of looped connections across GB, assessing their geographic distribution, the characteristics of affected households, and the extent to which they may impact the adoption of LCTs such as EVCPs and heat pumps. Second, it investigates viable solutions including policy interventions, technological advancements, and regulatory frameworks that could facilitate unlooping or alternative approaches to managing increased electricity demand. By addressing both themes, the research provides a comprehensive evidence base to inform decision-making by policymakers, network operators, and other stakeholders.

Scale and nature of the looped connections

This chapter examines the prevalence of looped connections in residential properties across GB, providing regional estimates and associated confidence levels. It quantifies the total number of looped connection properties and breaks this down by region, offering insight into their geographical distribution. Additionally, the chapter explores the typical characteristics of these properties at both regional and national levels, highlighting patterns in household types and property attributes.

The data for this chapter was collected from DNOs, and literature, including - DNO Engineering Justification papers and business plans, ensuring a comprehensive and accurate understanding of the current state of looped connections.

Quantifying looped connections

DNOs were asked how many looped connections were on their network. Estimates from each DNO are below in Table 1 and Table 2. To ensure anonymity, each DNO is represented by a letter or number, with the designation varying throughout the report.

Table 1: Estimated number of properties on a looped connection by DNO

DNO	~Looped Connections #
DNO A	805,000
DNO B	820,000
DNO C	500,000
DNO D	417,000
DNO E	810,000
DNO F	569,000
Total	**3.9 million (3.1 - 4.7 million** with a typical margin of error applied**)**

Table 2: Estimated number properties on a looped connection, as a percentage of total connections per DNO[10]

DNO	~Looped Connections (% of Connections)	Evidence Source	Methodology	Confidence Rating
DNO 1	~6%	Mix - known data and modelled estimate	Used digitised records from one of its service areas to extrapolate data (using assumptions) for other areas.	Medium (+/- 20% uncertainty estimate)
DNO 2	~10%	Estimate from grey literature	Lacked specific data on looped households. A previous estimate of 10% from a RIIO-ED2 document was used, although this estimate is from 2021, and communication with the DNO suggested that this is likely higher.	Low
DNO 3	~17%	Mix – known data and modelled estimates	Combined inspection data with geospatial modelling to estimate looped connections, utilising their full system connectivity model to remotely identify the presence of looped connections on its low voltage network.	High (adjustments made to modelled figure based on inspection data)
DNO 4	~25%	Estimate (unknown calculation method)	Provided an estimate for the number of looped properties but could not provide a documented calculation method.	Medium (+/- 10% uncertainty estimate)
DNO 5	~21%	Mix – known data and modelled estimate	Used digitised records of known loops to predict the number of looped connections in other areas.	High (*The model was 80% accurate, and adjustments were made to the estimated figure based on a spot check, with variations applied across the entire dataset*).
DNO 6	~22%	Known data – some errors	Provided an estimate for the number of looped properties from digitised records, although there appear to be some discrepancies in the reported data.	Medium (work underway to improve data)
Total	**~14% (~ 11-17% with a typical margin of error applied)**	-	-	-

[10] DNO coded differently to table above to protect anonymity.

Overall observations on the number of looped connections across DNO regions are outlined below, highlighting key estimates and variations across regions:

- The estimated number of looped connections across GB is between 3.1 million and 4.7 million, with a central estimate of 3.9 million. This range reflects the typical margin of error of 10-20% associated with the estimation methods used by the DNOs.
- The total number of household connections report across all the DNOs in GB is 28.5 million.
- The number of connections in each DNO area ranges from 2-8.2 million total household connections, with two of the DNOs having over twice as many total connections than each of the other DNOs.
- The estimate for the number of looped connections for each DNO ranges from ~400,000 to ~800,000, with a total of 3.9 million looped connections across the GB, which is 14% of the total connections (between 11.2% and 16.8% when accounting for typical margins of error).
- There is a considerable variation in the percentage of looped connections in each area, with values ranging from 6% to 25% of connections on a loop.

The results across different DNOs are impacted by varying levels of data availability, estimation methods, and confidence ratings. Calculation methods for the number of looped connections on their network varied by DNO, though it was generally through a mix of existing data records and extrapolated estimates.

DNO 3 uses a mixed-method approach combining modelled GIS data and real-world inspections to estimate looped connections. A key component is a connectivity model, developed through significant effort, which integrates multiple GIS data layers and enables network tracing. This allows for tracking connections, power system analysis, and identifying upgrade needs. A critical feature is nodal tracing, which tracks connections from the meter service termination (MST) back to the low-voltage (LV) main, helping determine how many customers share a looped service. While primarily data-driven, field inspections validate and refine model outputs, ensuring accuracy.

This sophisticated, data-intensive method provides high-confidence estimates of looped connections. While other DNOs could adopt a similar approach, it requires extensive data integration and modelling capabilities.

Characteristics of looped connection properties by region

The DNOs identified several property characteristics that serve as reasonable indicators of the likelihood of a property having a looped connection. These factors include the property's age, location, proximity to other properties, type (such as terraced or semi-detached housing), and the developer responsible for its construction.

Looped connections are commonly found in terraced, semi-detached, and small to medium-sized detached houses, particularly those built between the 1950s and the early 1990s.

Looped connections are more prevalent in suburban and urban areas and can sometimes be found in flats and townhouses. Many of these connections were introduced due to construction constraints or the need for cost-effective supply distribution. In this case, 'opportunistic' loops refer to connections that were made because they offered a practical and economic solution at the time. In some areas, modernisation efforts have resulted in non-uniform connection patterns. Overhead looped connections still exist in some areas, also in detached properties. Some regional variation exists, with different DNOs having varying levels of information of property characteristics.

While there are some common trends across DNO regions, looped connections do not follow a single, uniform pattern. The number of properties connected by a loop typically ranges from two to four, though in some areas, particularly in older industrial towns and where overhead networks persist, loops can extend to six or more properties. However, the number and distribution of looped connections vary by region, reflecting historical infrastructure decisions and differing network management approaches.

Impact of projected unlooping on rollout of LCTs

This chapter examines whether the projected rate of unlooping properties will hinder the adoption of domestic heat pumps and EVs. It explores current and future approaches by DNOs and assesses progress during RIIO-ED2. The chapter also estimates how many properties will be unlooped during RIIO-ED2 and RIIO-ED3. A key focus is the projected rate of unlooping and how many properties must be unlooped to support LCT uptake. It also considers the extent to which looped connections may limit LCT adoption, particularly in social housing.

The findings in this chapter are based on interviews with DNOs, trade associations, and LCT installers. Additional insights come from grey literature and analysis conducted by Eunomia Research and Consulting on this data, providing a comprehensive view of the impact of unlooping on LCT roll out.

DNO approaches to unlooping properties

DNOs currently employ a range of approaches to address looped services, broadly categorisable as either reactive or proactive. The prevailing approach across the sector is reactive.

Reactive unlooping is characterised by DNO intervention following a specific customer request. These requests are typically precipitated by one of two factors:

- Firstly, a customer's intention to install LCTs, such as an EVCP or heat pump, often necessitates a higher capacity connection than a looped service can provide.

- Secondly, an increase in general domestic electricity demand, even without LCTs, can surpass the capacity of the shared service, prompting a request for unlooping – this increase can arise from the installation of appliances such as induction hobs, electric showers, or air conditioning units.

To connect an LCT, installers must apply using the ENA EVCP/Heat Pump Application form.[11] Applications need to be submitted to DNOs via email, DNO website portals, or the ENA Connect Direct platform.[12] There are two types of applications: 'apply to connect' (where approval is sought before connection, when the new maximum demand is >60A per phase) and 'connect and notify' (where the connection is made first, followed by notification within 28 days post-installation, when the new maximum demand is ≤60A per phase) – the latter is not permitted if a looped service has been identified at the property in question.[13] The installer is responsible for accurately submitting the application, which includes details of the LCT and the maximum demand calculation. This is assessed by the DNO to determine if the total demand from all customers on the loop is above the rating of the shared equipment, and an intervention is required. It was noted that all the DNOs, except one, do not advise the installers on how to calculate maximum demand,[14] so there is no standard approach used. Upon approval, the DNO registers the asset, ensures network capacity, and makes any necessary adjustments. The installer handles the connection, while the DNO validates and tracks the asset within the network. The percentage of applications received through this platform differs across the DNOs, with one stating that 40% of LCT applications were received through Connect Direct as of November 2024 since its launch in April 2024. Traditional routes, such as notifying the DNO directly via email or their website portals are still being used. One DNO did however flag that the volume of connection applications from their traditional route has not decreased, but their Connect Direct figures have gone up, anecdotally suggesting that the Connect Direct platform has encouraged installers that were previously failing to submit a 'Connect and Notify' application in the past. In practice, this reactive approach means that engineers and technicians primarily focus their efforts on interventions that are essential to meet immediate customer needs and prevent service disruptions.

In addition to reactive unlooping, some DNOs are actively implementing proactive programs, identifying properties that are likely to require unlooping in the future based on projected LCT uptake and network capacity constraints. This work is carried out in advance of any specific customer request. These proactive investments are typically incorporated into multi-year investment plans, such as the RIIO-ED2 framework. To identify these at-risk properties, some DNOs are employing sophisticated predictive modelling techniques. These models often integrate data from the Distribution Future Energy Scenarios (DFES), insights gleaned from innovation projects focused on LCT uptake, and a combination of satellite imagery analysis, demographic data, and customer insights. Furthermore, digital network connectivity models are

---

[11] While this is the law, we understand that it is not always being adhered to.
[12] Connect Direct is a new platform that aims to streamline the process for how DNOs get notified of/ receive applications for the installation of LCTs. Available at: https://connect-direct.energynetworks.org/
[13] Energy Networks Association (2021) 'Electric Vehicle Charge Point and Heat Pump Connections Process'. Available at: https://www.energynetworks.org/assets/images/Resource%20library/Electric%20Vehilcle%20Chargepoint%20and%20Heat%20Pump%20Combined%20Installation%20Process%20Flow%20Chart%20v1.3.pdf
[14] Installers are often referred to Institute of Engineering and Technology (IET) guidance.

utilised to create granular forecasts, pinpointing individual looped properties that are most likely to require upgrades.

The section ‘Managing unlooping’, explores how each of the DNOs adopt these approaches in relation to the solutions employed.

Impact of looped connections on LCT uptake

The UK government has set ambitious targets for the deployment of LCTs, such as heat pumps and EVCPs, as part of its strategy to achieve Net Zero emissions. For heat pumps, the previous government set a target of the deployment of 600,000 heat pumps per annum by 2028[15], potentially needing to reach 1.6m[16,17] per annum by 2035. Some 80% of the current installations are retrofits, with the remaining installed in new-build housing. For EVs, the Zero Emission Vehicle (ZEV) Mandate[18] that came into force in January 2024 is a key part of the UK government's strategy to accelerate the transition to electric vehicles (EVs). Under this mandate, manufacturers are required to ensure that a certain proportion of the vehicles they sell in the UK are zero-emission, meaning fully electric or hydrogen-powered vehicles.[19]

These targets are essential for driving the transition, but they do not fully consider differences in housing types or the socio-economic backgrounds of residents. As a result, the feasibility and practicality of adopting LCTs vary across households, meaning suitability and uptake are not uniform. They are driven by two primary factors:

- **Socio-economic factors:** Historically, the uptake of LCTs has been disproportionately concentrated amongst more affluent households. The initial cost of purchasing and installing technologies like heat pumps and EVCPs can be a significant barrier for lower-income households, even with available grants and incentives.
- **Technical constraints:** Not all properties are suitable for LCTs. For example, nearly a third of households do not have off-street parking[20] and therefore are unlikely to charge their vehicles at home and therefore install EVCPs. While heat pumps can generally be installed in most homes, their feasibility depends on factors such as available space for an outdoor unit or potential planning restrictions due to proximity to neighbours. There were differing views from DNOs on the proportion of their housing stock that may need unlooping, ranging from 40-75%.

[15] DESNZ (2024) ‘Energy Security Bill Factsheet: Low Carbon Heat Scheme’. Available at: www.gov.uk/government/publications/energy-security-bill-factsheets
[16] NAO (2024) ‘Low heat pump uptake slowing progress on decarbonising home heating’. Available at: https://nao.org.uk/press-releases/low-heat-pump-uptake
[17] DESNZ (2023) ‘Responding to the Climate Change Committee’s (CCC) 2023 Annual Progress Report to Parliament’, GOV.UK. Available at: www.gov.uk/government/publications/committee-on-climate-change-2023-progress-report-government-response
[18] DfT (2024) ‘Pathway for zero emission vehicle transition by 2035 becomes law’, GOV.UK. Available at: www.gov.uk/government/news/pathway-for-zero-emission-vehicle-transition-by-2035-becomes-law
[19] DESNZ (2024) ‘Phasing out the sale of new petrol and diesel cars from 2030 and support for the zero-emission transition’, GOV.UK. Available at: www.gov.uk/government/publications/phasing-out-new-petrol-and-diesel-cars
[20] MHCLG (2024) ‘English Housing Survey’. Available at: www.gov.uk/government/collections/english-housing-survey

DNOs do not systematically collect data on which properties have looped electricity connections. Most unlooping is reactive, initiated by a homeowner's request for an LCT installation, rather than proactive identification by the DNO (see Table 5 for a breakdown by DNO). While some limited proactive unlooping occurs, this is not widespread. This reactive approach means that knowledge of looped properties and their occupants is heavily biased towards those already attempting to install LCTs. Therefore, there is insufficient data to reliably compare the characteristics of likely future LCT adopters with those living in properties with looped connections.

Will unlooping rates limit rollout of heat pumps, EVs, and solar panels?

The projected rate of unlooping presents a complex picture regarding its potential to limit the rollout of domestic heat pumps, EVs, and solar panels in GB.

Of the estimated 3.9 million looped connections in GB, only a small fraction (less than 1%) has been unlooped so far (as of January 2025) during the RIIO-ED2 period (2023-2028). Based on projections from five of the six DNOs, it is estimated that approximately 187,000 properties, representing around 5% of the total looped connections, will be unlooped by the end of RIIO-ED2 in 2028. These figures highlight the slow progress in unlooping, raising concerns about potential bottlenecks in the future, especially with the anticipated increase in LCT adoption.

While current projections suggest that unlooping might pose a bottleneck, the situation is highly contingent on several key factors, most notably, understanding of demographics, proactive government policy and the operational capacity of DNOs.

> *“Without proactive unlooping it would be difficult to meet Net Zero targets.”*
> *(anonymous DNO)*

The principal method for calculating the impact on the rollout of heat pumps, EVs, and solar panels would be to consider the proportion of historically delayed LCTs and use that rate to forecast forwards. However, the proportion of the LCTs historically delayed cannot be calculated because there is not sufficient data to break down the type of LCT that was delayed (e.g. when a property was unlooped, data has not been made available as to whether a heat pump or EV, or both). Furthermore, even if the historic proportion of the LCTs getting delayed was known (e.g. 5% of heat pump installations), it would have to be assumed that the same characteristics of the looped properties and households installing a LCT will prevail in the future. This is unlikely as the types of households installing LCTs will naturally change.

Furthermore, the future demand for unlooping is inextricably linked to the government's Net Zero targets and policy mechanisms for driving the adoption of LCTs. As it stands, the absence of clearly defined government targets and visibility at the household level for LCT deployment creates significant uncertainty around the scale and urgency of the required unlooping. The potential for widespread consumer-led adoption, particularly if EVs and heat pump installations become more affordable and accessible (e.g. through innovative business models such as heat as a service), introduces an additional variable. If consumer demand accelerates independently of government intervention, the pace of unlooping may need to be reassessed in response to market-driven uptake.

Another method would be to consider DNOs capacity to undertake unlooping works. However, DNOs resources will be primarily determined by the budgetary frameworks established within the RIIO-ED3 period (2028-2033). As planning for RIIO-ED3 by the DNOs is only just beginning, current data availability is severely limited, hampering any robust assessment. Projections were provided by only two out of the six DNOs, with the remainder yet to have established RIIO-ED3 unlooping forecasts, painting an incomplete picture. For these two DNOs, the projected unlooping rates are 71% and 14% of their existing looped connections within the RIIO-ED3 timeframe. For the DNO aiming for 71%, it is anticipating a particularly ambitious unlooping program (through reactive and proactive unlooping). Such a skewed dataset demands a cautious interpretation. It is premature to extrapolate these limited projections across all DNOs and definitively conclude on the overall national rate of unlooping.

Finally, the skills shortages reported within DNOs creates an additional layer of complexity and potential bottleneck. Two DNOs have raised concerns regarding the availability of skilled personnel essential for unlooping works, including line workers, Senior Authorised Person (SAP) level contractors, and jointers. This scarcity of skilled contractors, coupled with internal competition for these resources within different arms of the DNOs themselves, could further constrain the rate at which unlooping can be effectively delivered. Some DNOs also mentioned internal constraints, such as pressures on legal teams managing neighbour disputes and administrative staff handling the increasing volume of applications alongside the unlooping works, may create challenges going forward.

While projected unlooping rates may constrain LCT uptake, this is uncertain due to data quality. If the government is to meet its Net Zero targets, then clear policy direction on LCT adoption, accurate forecasting of unlooping requirements within RIIO- ED3, and critically, the successful mitigation of skills shortages within DNOs and their contractors will be required. Without concerted action across these fronts, the projected unlooping rate may become a limiting factor in the rollout of domestic heat pumps, and EVs necessary for the UK's Net Zero transition.

Impact of unlooping delays on social housing decarbonisation schemes

Decarbonising social housing is a critical component of the UK Government’s Net Zero strategy, with schemes such as the Social Housing Decarbonisation Fund (SHDF) playing a key role in improving energy efficiency and reducing carbon emissions. However, the process of unlooping electrical connections, essential for the installation of LCTs such as heat pumps, is proving to be a significant barrier.

We engaged with three housing associations during this research, and all have encountered setbacks due to the presence of looped electrical connections. These delays have forced providers to either scale back or postpone planned heat pump installations.

An issue exacerbating unlooping delays is the inconsistency in the approaches taken by DNOs. There is considerable variation in how DNOs process unlooping applications, share necessary data, and set technical requirements. Some DNOs require that all looped properties in a group be unlooped before any new heat pump connections are permitted, while others allow installations within certain technical limits. Furthermore, housing providers have expressed frustration over the administrative burden of applying for unlooping on an individual basis rather than through a streamlined, mass-application process.

The slow rate of unlooping for these large-scale retrofit schemes presents a growing obstacle to the decarbonisation efforts of some housing providers. Some providers have managed to unloop only a fraction of their affected properties - one provider has unlooped just 24 out of 900 applications since 2023. In extreme cases, unlooping applications have been stalled for over three years, with the housing association stating the DNO said this was due to processing delays and resource limitations. As the scale of retrofit and decarbonisation programs continues to expand, these challenges are likely to become even more pronounced. In addition to administrative delays, the lack of clear policies and dispute resolution mechanisms means that private homeowners within shared looped connections can obstruct progress. It is also worth noting that looped connections are not covered under Ofgem’s Guaranteed Standards of Performance (GSOPs), which further complicates the resolution of issues in these cases. Contractors, who are ready to install heat pumps, are left waiting due to unlooping-related delays, resulting in inefficiencies across the supply chain.

Despite these challenges, potential solutions exist that could alleviate the impact of unlooping delays. Some housing providers are exploring the use of load-limiting devices to circumvent the need for immediate unlooping. Additionally, one housing association mentioned they used a current transformer clamp (CT clamp) monitoring, which showed that many heat pumps operate well below the maximum allowed amperage and then went on to suggest that DNOs may be applying overly cautious restrictions.

One installer highlighted the prevalence of looped connections in high-rise buildings and the challenges they pose when installing smaller heat pumps to replace direct electric. The high upgrade costs (supply and unlooping) passed onto building owners associated with unlooping were noted as a significant barrier, despite the fact that some of the heat pumps being installed have significantly lower electrical loads than the direct electric heating they are replacing or the alternative. This suggests the upgrades are not necessary and this should not be a barrier to installing heat pumps in high rise buildings, and it is not fully clear as to why they are having to unloop in these circumstances. The installer also pointed to delays and bureaucratic hurdles in the unlooping process, which can extend project timelines significantly.

It appears that unlooping delays are undermining the effectiveness of government-backed decarbonisation initiatives for social housing. Without urgent intervention, these delays will continue to hinder the installation of low carbon heating systems, slowing progress toward Net Zero targets. However, the recent steps taken by DNOs to improve processing and engagement with social housing providers offer a potential path forward, provided they lead to tangible reductions in delays and administrative burdens.

DNOs are actively engaging with social housing providers to address unlooping delays, with four explicitly stating they are implementing structured engagement initiatives. However, there remains variability in the extent to which DNOs have specific measures in place to mitigate delays for social housing projects. Moving forwards, adopting more tailored engagement plans, dedicated resources, and improved coordination mechanisms will be crucial in ensuring that the decarbonisation of social housing remains on track with national Net Zero targets.

Investigating solutions to looped connections

This chapter provides an overview of policy, technological, and innovative solutions to the challenges posed by looped connections. It examines the suitability and cost of existing solutions, including those that enable LCT uptake without unlooping. The chapter also compares the prices (albeit with limited data) and timescales of these alternatives and assesses whether they support all types of LCTs. Additionally, it summarises the technological solutions and techniques used to minimise the impact of unlooping, helping to avoid delays in LCT installation.

The findings in this chapter are primarily drawn from discussions with DNOs, providing insights into industry perspectives, current practices, and potential improvements in managing looped connections.

Technology solutions to looped properties

If a connection is looped, it is assessed based on the number of properties that are connected to the service along with the number of existing and proposed LCTs. The initial assessment considers the risk of exceeding the maximum allowable demand on the properties on the loop. If the risk of exceeding maximum allowable demand has been identified, there are several solutions available to the DNOs to address this. These include full unlooping, partial unlooping, or using other techniques to avoid or postpone the need for unlooping, so as not to delay LCT installations.

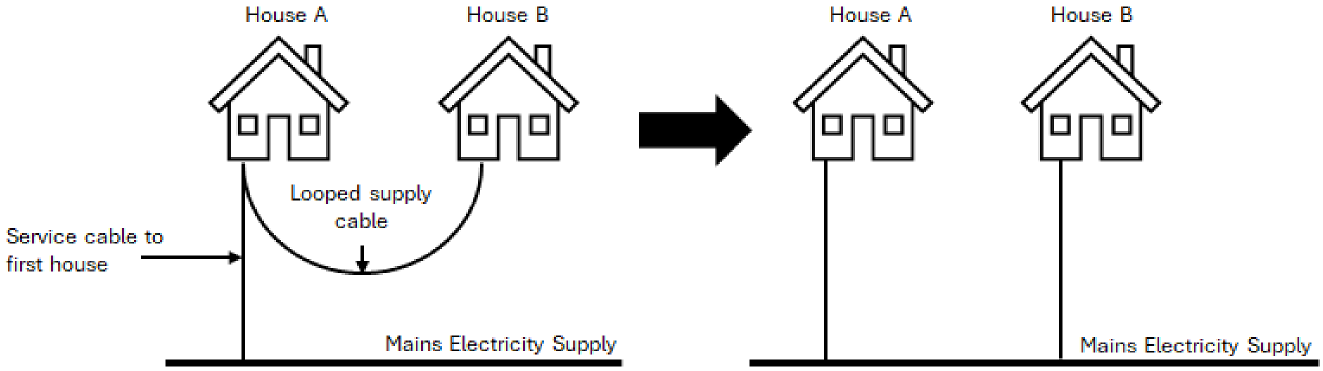
Full unlooping

The primary solution for tackling looped connections is to unloop the households. One DNO stated:

> *“Unlooping is the only solution that accommodates the increase in customer demand, enabling customers to decarbonise.”*

Typically, the cable connecting the houses will be disconnected from the shared cut-out, and a new service cable will be installed between the main network and the neighbour's (shown as House B in Figure 3) meter position.

Figure 3: Diagram showing how looped houses are connected to a mains electricity supply before and after full unlooping



The cut-outs in each property would typically be upgraded to 80A or 100A fuses. In some cases, the existing service cable to the main network will also be replaced (from House A to the main electricity supply). Currently, one DNO is offering a three-phase supply upgrade as part of some of their proactive unlooping process (where technically and economically feasible to do so), without the consumer having to pay any additional costs. All DNOs offer a 3-phase upgrade as part of the reactive process, but the consumer is responsible for the cost of the upgrade.

The laying of new cables will almost inevitably require groundworks (digging up and relaying of front gardens, pathways and driveways) for House B and potentially for House A, unless the looped service is an overhead connection, in which some internal works may be required depending on where the cable enters the property. In some instances, DNOs may also need to obtain a permit from the local authority to work on the road or pathway. Regulatory standards, such as the Guaranteed Standards of Performance (GSoPs), do not currently apply to unlooping. This means the timescales, and level of service that households receive in tackling this issue is not uniform or regulated. This can lead to problems, with 'charger anxiety' (concerns about delays or uncertainties in getting an upgraded electricity supply to support EVCPs) increasingly recognised as a key issue. Additionally, it exacerbates the ‘distress purchase’[21] barrier to heat pump rollout, making it harder for households to transition to low-carbon heating when their existing system fails.

The Ofgem End-to-End Review[22] highlights significant issues related to unlooping, particularly delays in unlooping processes that impact the connection of LCTs such as heat pumps, EVCPs, and rooftop solar installations. The review also identified inconsistencies in policies between DNOs regarding looped connections, contributing to customer confusion and service delays. In line with findings from our own interviews, this lack of standardisation creates operational challenges for customers and DNOs alike. Ofgem is considering introducing new incentives, along with minimum service requirements and penalties, to address these issues.

[21] When a household's boiler breaks down, especially in winter, people need a quick replacement to avoid being without heating or hot water for too long. A new gas boiler can typically be installed in a day, whereas a heat pump installation can take longer, particularly if an electricity supply upgrade (such as unlooping) is required.
[22] Ofgem (2024) ‘Connections End-to-End Review Consultation’. Available at: www.ofgem.gov.uk/consultation/connections-end-end-review-regulatory-framework

These measures aim to improve service levels, reduce delays, and enhance DNO accountability in facilitating connections, particularly for looped connections and LCTs. Ofgem's consultation on these matters ran from November 2024 to January 2025, overlapping with the timeline of this project.

Full unlooping is the costliest solution due to the nature of the works required. The cost of unlooping varies significantly from case to case, making it difficult to provide an exact figure. The costs are highly bespoke, depending on factors such as the type of property, the specific infrastructure upgrades, and other site-specific conditions.

The rapid evidence assessment identified one source that stated an average cost of £2,639.[23] One DNO indicated that the cost of an unlooping job is usually £2,500 - £6,000, while another DNO indicated a narrower range of £3,500 - £4,000. Although for some complex works, the cost can rise to £10,000-£15,000. DNOs stated they handle any reinstatement or remedial works at their cost and to the customer's reasonable satisfaction. Driveways can be a big factor in the costs for DNOs in unlooping works, there have been cases where DNOs spent over £10,000 on reinstating driveways that are printed concrete or resin, for example. A challenge the DNOs are facing in relation to this is that the financial payment they currently receive for unlooping, via the price control mechanism is not always sufficient to cover their costs.

All DNOs state that the customer does not pay for standard unlooping works - the cost is socialised. However, customers may be required to pay for additional works, for example, for a three-phase upgrade being carried out in parallel, or for moving the meter entry point at the same time. One DNO is considering applying a charge for reinstatement works over and above a particular standard because they need to produce a procedure for managing large claims for, e.g. for driveway reinstatement.

The timing from initial engagement through to completion of the unlooping varied depending on the DNO. Timeframes for unlooping also vary significantly depending on the specific scenario. Where there are no complications, one DNO stated it can take between 3-12 weeks. If there are issues e.g. neighbour disputes, it can take up to 6 months to a year, and even longer in some cases. Other influencing factors include the type of driveway, the extent of works required, other permissions needed e.g. traffic management, and, critically, the availability of contractors.

Partial unlooping

Like unlooping, this requires the cable connecting the houses to be disconnected from the shared cut-out position, and a new cable installed. However, instead of the new cable connecting to the main network, it will be installed between the existing connection to the main network.

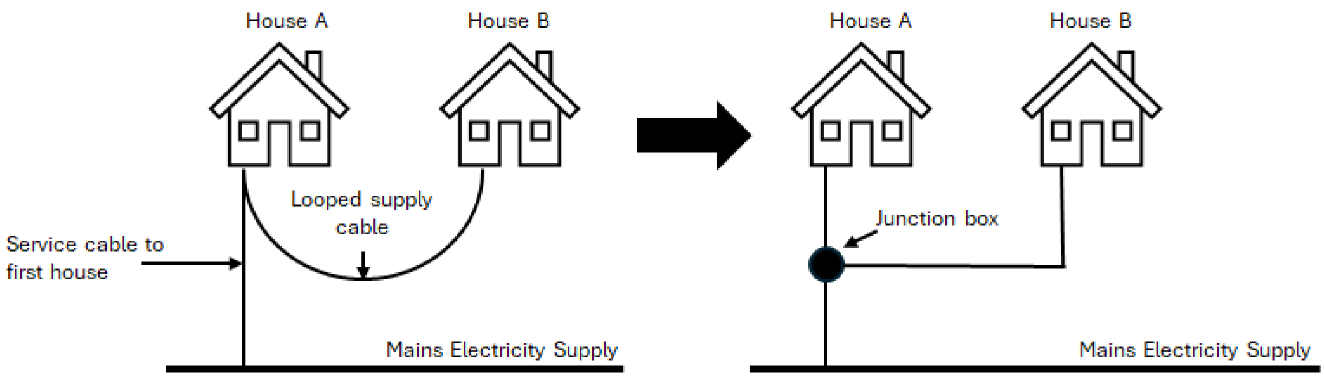
This involves moving the looped supply cable from where it exits the cut-out of the first property in the loop (House A) and onto the next house in the loop (House B). This is done by joining the supply of the property or properties after the first house in the loop to the service

[23] Electricity North West (2021) 'Service Unlooping Programme'. Available at: www.enwl.co.uk/about-us/networkinvestment/unlooping/

cable of their neighbour – using a junction box (as shown in Figure 4. This means each neighbour now share a service cable and can have their current capacity increased without unlooping fully. By relocating the loop outside the property, it enables the reinforcement of the cut-outs, allowing for the uprating of the cut-out fuses typically from 60A to 80A or 100A, and eliminating the risk of overheating and failure of above-ground assets. This option is only feasible if the shared service cable has sufficient capacity. Whilst the benefits are that it can be carried out faster than full unlooping and can reduce the extent of groundworks required, typically it is only used for loops no greater than two properties.

Data on the costs of partial unlooping was not available from the DNOs, but qualitative statements were that it was cheaper than full unlooping as less ground work are required. The rapid evidence assessment identified one source that stated an average cost of £943 (versus £2,639 for full unlooping).[24]

Figure 4: Diagram showing how looped houses are connected to a mains electricity supply before and after partial unlooping



Solutions enabling LCT uptake without unlooping, or avoid delaying LCT installation

Other techniques may also be used to either avoid the need for unlooping, or act as a short-term measure to avoid delaying of the LCT installation until unlooping can be scheduled in. These include:

Cut-out fuse upgrades:

If the first house in the loop upgrades their fuse, the rest of the loop will benefit from the increased capacity, but only if the service cable's capacity allows.

In this circumstance load calculations will need to be made by the installer to justify a fuse upgrade. In some circumstances the DNO may also automatically upgrade the fuse upon LCT connection request if the existing cut-out assembly – either the fuse itself or the wider cut-out unit is not of a modern or suitable specification for the supporting and increased load.

[24] ENWL (2021) 'Service Unlooping Programme'. Available at: www.enwl.co.uk/about-us/networkinvestment/unlooping/

This is the most basic option and is likely to only be viable if one property on the loop requires an upgrade due to a planned LCT installation. If in the future, a second neighbour on the same looped supply also wished to install an LCT the fuse upgrade would be unlikely to support their LCT too, at which point both properties would need unlooping.

Data on the costs of cut-out fuse was not available from the DNOs, but it will be markedly cheaper than full unlooping. Quotes discussed on consumer forums suggest costs in the order of several hundred pounds.[25,26]

Load management (CT clamps):

Current Transformer (CT) clamps are attached to a house's service cable, typically at the point where it enters the meter.

The CT clamp monitors the current flowing through the service cable, measuring real-time data on the amount of electricity being used. This information can then be used by connected systems, such as EVCP software or heat pump controllers, to manage electricity demand. If demand exceeds certain user-set thresholds, the system can reduce the power used by the EVCP or the heat pump to prevent overloading, ensuring that other priority appliances continue to receive power. This may result in lower performance and efficiency. They are typically included with many EVCP brands but are more rarely included with heat pumps, but they can still be used with them. The benefits are that they are inexpensive and can also be installed without requiring an electrician or DNO permission. They are also cheap, with DNOs providing a cost estimate of £30-£50. They do however limit the flexibility of LCT use, for example, if fast EV charging is required during peak household energy consumption in the morning or evening. Like fuse upgrades, it may become redundant if another neighbour in the loop decides to install an LCT.

There are other potential load management techniques that consumers could use to enable LCT uptake without unlooping, as follows, however, these are consumer-driven strategies rather than solutions that DNOs would use:

- Utilising Periods of Low Demand - A technique that is already deliberately taken advantage of by people with LCTs (mostly EVs) – regardless of whether they are looped or not, due to some energy providers providing time-of-use tariffs.
- Load Management – Choosing a Low Power LCT that will not draw enough power to require any kind of other load management or unlooping.

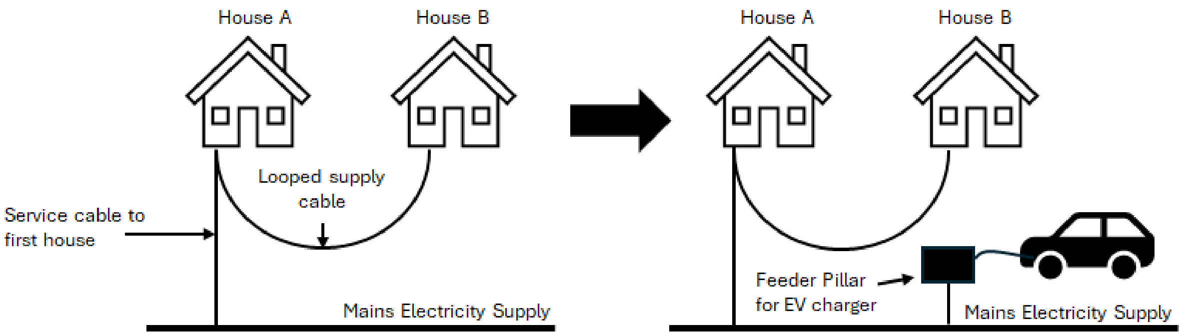
EV Feeder Pillars:

If a looped property requires EVCP(s) to be installed, the property may remain on the loop but have a feeder pillar connected to the mains supply with the EVCP connected to it. The feeder pillar has its own separate meter to monitor power consumption (see Figure 5).

---

[25] MyEnergi (n.d.) 'Has anyone had a free un-looping of their electric?' Available at: https://myenergi.info/has-anyone-had-a-free-un-looping-of-their-electric-t5927.html
[26] SpeakEV (n.d.) Cost of upgrading main fuse 80A to 100A. Available at: www.speakev.com/threads/cost-of-upgrading-main-fuse-80a-100a.142253/

Figure 5: Diagram showing how EV feeder pillars can connect to the mains electricity supply where a household is looped



Direct cost data for EV feeder pillars was not provided by DNOs; however, the reduced scope of civils work compared to a full unlooping procedure suggests a lower overall expenditure, as there is no work needed on a neighbour's driveway and, less groundwork needed on the customers driveway.

Feeder pillars can also offer flexibility in terms of number of charge points or three phase EV charging to be installed for faster charging. One DNO mentioned that while they offer feeder pillars as a solution (the only DNO that mentioned it), the uptake has been very low. The DNO suspected that this is due to the feeder pillar having a perceived negative aesthetic impact on properties.

Summary of technological solutions:

Table 3 provides a summary of each solution. It ranks technical complexity and relative cost to each other with a qualitative high to low rating. It also identifies whether each solution acts as an intermediate/ temporary measure that allows LCT installation but may require future works if further LCTs are introduced on the same loop; or if it resolves the issue completely. Finally, the table summarises the pros and cons of each solution.

Table 3: Unlooping solutions summary

Type of solution	Complexity	Relative cost	Longevity	Pros and cons
Full unlooping	High	High	Issue resolved	Permanently resolves capacity limitations, providing a future proofed solution (+) Improves long-term safety and reliability, eliminating overheating risks in above-ground assets (+) Can be longer than other solutions, if work is complex or neighbour disputes occur (-)
Partial unlooping	Medium/ High	Medium	Issue resolved (but with some limitations on circumstance s it can be implemented)	In the right circumstance it is faster than full unlooping and can reduce the extent of groundworks required (+) Reduce the cost compared to a full unloop (+) Relies on the capacity of the shared service cable, so typically it is only used for loops no greater than two properties, or the last property on a loop (-) May still require full unlooping in the future if demand increases beyond what the existing cable can support (-)
Feeder pillars	Medium	Medium	Issue resolved (but with some limitations on circumstance s it can be implemented)	Provides a faster solution compared with unlooping (+) Only suitable for EVCPs and properties that are suitable e.g. with off street parking (-) Is potentially unsightly (-) This is an innovative area, so not widely deployed at present (-)
Cut-out fuse upgrade	Low	Low	Temporary measure/ intermediate solution	Can provide a short-term solution until unlooping of properties can occur at some point in the future (+) Not future proof, and not a long-term solution to unlooping (-)

Type of solution	Complexity	Relative cost	Longevity	Pros and cons
Load management	Low	Low	Temporary measure/ intermediate solution	If used by a DNO this is can be a short-term measure before unlooping, allowing people to connect on a loop (+) It may also be used by an installer to avoid unlooping (+) Limits the flexibility of EVCP use as reduced power may extend charging times. (-) Limits home comfort for heat pumps, as reduced power could affect heating performance and efficiency. It may become redundant if another neighbour in the loop decides to install an LCT (-)

Moling – a technique used to reduce impact of unlooping and partial unlooping

Moling assists in minimising the impact of unlooping groundworks in certain circumstances. Moling is a technique used to install or replace underground utility cables without requiring extensive digging. It uses a pneumatic device known as a 'mole', that creates a tunnel below the surface, and on its return along the tunnel it drags the cable into position. This method avoids the need for open trenches, minimising disruption to the surrounding environment, making it a faster and easier process. The use of this technology can be costly and was considered by one DNO to be a more viable solution for proactive unlooping projects where the mole is kept in the same area for an extended period of time, with transportation costs being reduced.

Figure 6: A worker using a mole to unloop a property

Source: Provided by SPEN

Managing unlooping

As discussed briefly in section 'DNO approaches to unlooping properties,' there are two main approaches to unlooping: reactive and proactive.

Reactive unlooping

The 'Reactive' approach is where customers (via their installer) on a looped supply have contacted a DNO to request their property is unlooped either themselves or via a third-party.

Based on DNOs assessment of 'apply to connect' and 'connect and notify' applications from installers, several different approaches are taken, as outlined below. Each DNO uses a different combination of these approaches (as discussed further in Table 5).

- **Arrange for the unlooping to occur as soon as possible** - contacting the customer directly involved in the unlooping activity and any neighbouring properties who share the looped service and arranging for unlooping to occur. In some instances, the DNO may consider unlooping all customers on a shared supply to aid future adoption of LCTs, in a hybrid 'reactive-proactive' approach.

- **Allow the LCT to be connected and then unlooping in future** - in many cases (one DNO estimated, over 90% of the time), the first LCT on the loop can be accommodated without the need to unloop but may in some instances include a cut-out fuse upgrade. As a result, most LCT applications/ notification for customers on a looped supply would result in the customer being permitted to connect their LCT without the need for intervention. One DNO provided an example of the thresholds before unlooping was required, in terms of the number of properties on a loop and number of LCTs proposed, as shown in Table 4.

This, for example, shows two houses on the same loop can connect one LCT each and still not need to be unlooped in some cases. One DNO quoted:

> *"Whilst minimising de-looping volumes today reduces the barriers for LCT connections in the short term, it introduces barriers for future connections given that the second LCT on a loop will typically require a de-loop before connection."*

- **Connect LCT, install load limiter, and then unloop in future** – This approach is used by several DNOs as another mechanism to manage their capacity to unloop, whilst not impacting on LCT uptake. It is used in those circumstances where the introduction of the LCT could lead to demand being greater than the system's rating, which is more likely for an EVCP. In this circumstance, as a short-term solution, a load limiter can be introduced allowing the installation and use of the LCT until unlooping can be arranged and scheduled in.

Table 4: Low carbon technologies looped service guidance

Number of looped houses	No of LCTS (HPs/ EVCPs/ PV/ BESS)	Unloop
1 (2 house on 1 service)	1	No
1 (2 house on 1 service) *	2	No
2 (3 houses on 1 service)	1	No
2 (3 houses on 1 service) *	2	No
3 (4 houses on 1 service)	1	No
Any other combination		Yes

*In this scenario, the shared service cable rating should be 0.04mm2 conductor with lead sheath, or larger.

Proactive unlooping

'Proactive' unlooping is an emerging approach for several DNOs that use data to predict localised areas of LCT uptake. These areas are then assessed using existing data on the looped connections within those areas. This allows the DNOs to forecast which looped services are most likely to require upgrades in accordance with their Distribution Future Energy Scenarios (DFES). Due to the number of properties forecast to require unlooping, this is seen by a number of DNOs as necessary to meet Net Zero timelines without creating barriers for customers. Proactive delivery is also seen as having other benefits including reducing overall disruption to neighbourhoods with high volumes of looped properties, providing the ability to coordinate with other required interventions in the area, and full streets and communities being made Net Zero ready, ensuring readiness to adopt LCTs.

One DNO explained that it is around 25-30% cheaper to unloop proactively rather than reactively, due to economies of scale and efficiencies in mobilisation when engineers and equipment are working in a localised area e.g. a street. Also, inevitably this mitigates the risk of neighbour disputes, as the need for upgrade is being led by the DNO and along the whole street, so it is not seen as being caused by a single neighbour's needs.

Unlooping approach adoption

Current and future DNO policies

Each DNO has a different combination of approaches to managing unlooping:

- Whilst all undertake reactive unlooping, there are also a variety of preferred approaches to managing looped connections. For example:
    - DNO 1 allows the installation of a LCT where it is known to be the first LCT installation on the loop, with a plan to unloop at a later stage. This approach can be summarised as reactive unlooping when the looped service rating is at risk of being exceeded. This results in effort being made by engineers and technicians to only intervene when absolutely required for a customer request. This DNO will shortly be changing their policy from this approach, to unlooping anyone that applies to install LCT on a loop. This includes solar PV notifications as well, given the assumption that it is likely for a household installing solar PV to then get an EVCP or heat pump in the near future.
    - DNO 2 allows the installation of a LCT if the maximum demand would remain below 60 Amps. If the maximum demand would exceed 60 Amps, permission will be granted to install the LCT if there is a load limiter on the system.
    - DNO 3 similarly allows for LCT installers to use load-limiters as an interim solution, to prevent the overloading of the services as a temporary measure until the unlooping job can be carried out.
    - DNO 4, DNO 5 and DNO 6 do not use load limiters at all and rely on unlooping where installation of an LCT will exceed maximum demand. This is due to DNOs focusing on unlooping as the preferred solution to looped services, with one DNO mentioning a ‘touch it once’ approach that avoids the need to revisit and minimises cost and disruption. This will typically result in all customers on the looped service being unlooped.
- Only one DNO is undertaking proactive unlooping (see Figure 7), as a core part of their unlooping strategy, one has done this on a limited basis (some overhead services), the others have trialled this or are now moving into the planning stages of trialling this.
    - One DNO is proactively unlooping at scale.
    - One DNO is undertaking proactive unlooping specifically on some overhead line connected properties, however the rate of delivery was slowed down due to challenges with lack of customer interest and subsequent engagement.
    - Another has begun trialling proactive unlooping, and another are looking to trial this year.

- The remaining two DNOs aren't proactively unlooping at present, or planning trials to do so, although one DNO is undertaking a more 'reactive-proactive' unlooping approach, whereby on request by one property, it will unloop all properties on a loop even if it isn't required (i.e. if someone on the end of a loop of 4 wanted an LCT, they could be unlooped leaving everyone else on the loop to minimise the works required).

Figure 7: Street level proactive intervention

Source: Provided by DNO in data request

Table 5: Level of adoption of approaches to manage unlooping

Type of solution	DNO 1	DNO 2*	DNO 3	DNO 4	DNO 5	DNO 6
Reactive unlooping	Y	Y	Y	Y	Y	Y
Connect LCT and then unloop in the future	-	Y	-	Y	Y	-
Connect LCT, install load limiter and then unloop in the future	Y	-	Y	Y	-	Y
Proactive unlooping	Y**	-	-	-	Y	-
Proactive unlooping trials planned	-	-	-	Y	-	Y
Feeder Pillars	-	-	-	Y**	-	-

* Changing policy shortly to unloop anyone who applied to connect on a loop
** Only recently started proactive unlooping with limited success
*** Uptake limited to date

Consumer attitudes to looped connections and unlooping

This chapter explores consumer attitudes toward looped connections and the unlooping process, identifying key barriers and motivations. It examines reported neighbour disputes, consumer concerns, and perceived benefits of unlooping. The chapter also considers whether proactive unlooping could encourage greater adoption of LCTs.

Findings are primarily based on consumer surveys and forum discussions, incorporating insights from both those who have been unlooped and those who have not. This includes not only attitudes of those yet to undergo unlooping but also observations and experiences from those who have already been unlooped. These insights can help inform future policy to address consumer challenges and improve engagement with the unlooping process. The survey received 1,007 responses, with 934 participants who had not undergone unlooping and 73 who had. Of those not unlooped, 221 had installed an LCT, while the remaining 713 had not. Among those who had been unlooped, 64 had an LCT installed, while 9 had not and were unlooped either due to a neighbour's request or as part of a proactive unlooping program.

The challenges to ramping-up unlooping rates are not limited to the logistical and financial requirements, but also how consumers have contrasting attitudes and experiences with unlooping, which has caused delays in the process. The rapid evidence assessment and interviews highlighted many of these issues, from drawn-out disputes with neighbours, to prolonged periods of disruption caused as a result of unlooping works – such as having electricity supplies temporarily disconnected. These findings enabled the consumer survey to be targeted toward them through targeted question design and focused sampling, providing a much clearer understanding of consumer attitudes to looped connections and unlooping. Many consumers are broadly unaware of what looped connections are, and how they may impact themselves or their neighbours, should they decide to install an LCT – survey results showed that only 12% of respondents knew about looped connections prior to the survey, discounting those who had already been unlooped. Of these people, 47% already had an LCT installed, which naturally makes them more likely to be aware of looped connections.

Barriers for consumers to unloop

This section brings together the different elements of the unlooping process that may be barriers consumers face when going through the process, from getting consent from neighbours to the varying proportions of disruptive works that it entails.

Unlooping as a barrier if disruptive work is required

Evidence from rapid evidence assessments, qualitative interviews, and consumer surveys clearly demonstrates that disruption from unlooping works presents a significant barrier to LCT adoption. Multiple stakeholders including DNOs, installers, and housing associations have reported cases where consumers abandoned LCT installations after learning about required unlooping work, though specific data on frequency is limited. One DNO specifically noted instances where customers began the LCT installation process but withdrew after discovering the disruptive unlooping work required; a pattern likely occurring across all DNO regions.

Survey results indicated that the most important factor encouraging consumers to consent to unlooping was financial compensation, followed by guaranteed repair duration and control over when repairs take place.

The survey then examined the issue of disruption in more detail, using three typical elements of unlooping disruption with varying timeframes. For driveway/garden trenching:

- more than half of respondents found even a 2-day scenario disruptive or very disruptive, with approximately 30% saying it would impact their LCT adoption decision
- this increased dramatically with duration, with about 71% considering a 5-day scenario disruptive and nearly 50% indicating it would affect their LCT adoption decision

Notably, the proportion of respondents finding these scenarios ‘very disruptive’ rather than just ‘slightly disruptive’ increased significantly with longer timeframes. These results remained consistent across different property types, regions, and area classifications throughout the GB, suggesting universal concern regardless of housing situation.

Similar patterns emerged for indoor electrical works and temporary grid disconnection, with longer timeframes correlating to higher perceived disruption and a greater negative impact on LCT adoption decisions. The findings confirmed that driveway excavation represents the most concerning element of unlooping for many consumers, yet other elements, such as electrical works inside the home also being a concern amongst consumers.

Interestingly, consumers who had already experienced unlooping reported higher satisfaction levels than might be expected from the concerns of those who had not.

The overwhelming majority of previously unlooped consumers expressed satisfaction with work timeliness, regardless of whether they had subsequently installed LCTs. This suggests a gap between anticipated disruption and actual experience. When asked about individual elements of the process, satisfaction was high across all areas, including:

- Communication and engagement by DNO on the unlooping process
- Communication and engagement by the installer on the unlooping process
- How easy or difficult it was to plan and agree on the unlooping works
- Level of disruptions to driveway
- Electrical work inside home
- Timeliness of works
- Impact on neighbours with shared connection
- Temporary disconnection from the grid
- How cooperative neighbours were
- Quality of works

These findings highlight that, overall, satisfaction was consistently high across all elements of the process, with only minor variations in specific areas.

The findings highlight several key implications for LCT adoption and DNO operations. Work duration significantly impacts consumer perception of disruption, with even short-duration work causing concern for many. DNOs report that the reactive nature of current unlooping processes often leads to delays, though current satisfaction levels among previously unlooped consumers remain high. However, DNOs expressed concern that these satisfaction levels might decrease as unlooping requests increase to match projected LCT adoption rates. The survey results suggest that minimising disruption duration could substantially reduce this barrier to LCT adoption, while better consumer education about the actual unlooping experience could help address unfounded concerns that may prevent consumers from proceeding with LCT installations.

Unlooping as a barrier if neighbour agreement is needed

Beyond physical disruption, there is also the need to engage with neighbours who share the same looped supply. Stakeholder interviews revealed this can be particularly challenging when existing relationships are already strained or when neighbours have concerns about property damage, especially after recent driveway renovations.

DNOs reported varying frequencies of neighbour disputes related to unlooping connections. One DNO experienced a significant increase, from three cases in 2021 to 30 in 2024, with 20 remaining unresolved. While other DNOs acknowledged the occurrence of disputes, they were unable to provide specific figures. Notably, one DNO highlighted that pre-existing strained neighbour relationships significantly prolong resolution times. Conversely, proactive unlooping programs involving simultaneous upgrades for multiple properties were reported to reduce disputes, likely due to increased resident acceptance when the process is shared.

Further anecdotal evidence from online consumer forums like ‘Reddit’ and ‘SparkEV’ indicates prolonged dispute resolution times, sometimes exceeding six months, though these sources may disproportionately capture extreme cases.

DNOs have procedures for resolving neighbour disputes during unlooping work. Initially, they explain requirements and attempt to gain consent through visits or letters. For example, one DNO uses a three-attempt approach before implementing a formal process: requesting contact within seven days, referring to their legal team if needed, and issuing increasingly urgent letters that may warn of disconnection, although it had never reached this point to date.

When disputes occur, one of the DNOs mentioned they advocate benefits like improved capacity and safety, while others planned proactive programmes, aiming to reduce dispute frequency. Another DNO said they handle each case individually with no set timeline, preferring negotiation over forced compliance. Some prefer technical solutions like load limiters rather than pursuing court orders.

All DNOs cover costs for removing looped services and installation work, but do not clearly state whether this extends to costs from neighbour disputes or legal action. One DNO explicitly states they provide no compensation beyond covering work costs, suggesting customers or neighbours legal fees would not be included.

Survey results showed divergent comfort levels regarding neighbour interactions for unlooping. Among consumers without LCTs, slightly more respondents felt uncomfortable approaching neighbours about unlooping work than those who felt comfortable; however, this difference was statistically insignificant. Interestingly, this pattern shifted for respondents who already had LCTs installed, with a slightly higher proportion feeling comfortable initiating these discussions. This difference may stem from non-LCT owners lacking clear understanding of unlooping benefits or procedures, potentially overestimating disruption, or simply reflecting difficult neighbour relationships.

Despite these concerns, actual experiences suggest neighbour cooperation is much more common than anticipated. Among surveyed consumers who had been unlooped, less than 5% reported uncooperative neighbours, with none reporting extremely uncooperative experiences. The vast majority indicated their neighbours were cooperative or very cooperative during the unlooping process. This disparity between anticipated difficulty and actual experience mirrors findings about physical disruption - consumers who have not been through the process tend to expect more problems than typically materialise, reflecting a pessimism bias. This suggests potential value in better communication about the high levels of neighbour cooperation usually encountered during unlooping processes, which could help overcome this perceived barrier to LCT adoption.

Consumer consent for unlooping at a neighbour’s request

This research question examined unlooping from the perspective of neighbours who must consent without initiating the unlooping request themselves. Survey results revealed notable differences in attitudes between those with and without LCTs. Among non-LCT owners, there was a fairly even split between respondents expressing potential discomfort with a neighbour making an unlooping request that impacted their property, compared to those feeling comfortable (excluding neutral responses). Conversely, LCT owners showed higher comfort levels with such requests. This disparity likely stems from LCT owners' sympathy toward others wanting similar installations, while the non-LCT group's limited understanding of unlooping and lack of intention to install LCTs may create natural scepticism, highlighting how awareness gaps potentially hinder LCT adoption. Though responses showed minimal variation by property type, rural residents in both groups demonstrated slightly higher comfort levels with neighbours' unlooping requests.

Overall, actual experience does not match some of the concerns associated with engaging neighbours - only 7% of respondents reported significant disruption to neighbours during unlooping, with the vast majority experiencing minor or no disruption.

These findings suggest consumers would be more likely to consent to unlooping at a neighbour's request once properly informed about the process, including reassurances about cost coverage and property restoration. The difference in attitudes between those unfamiliar with unlooping and those who have experienced it highlights the importance of education and clear communication in facilitating LCT adoption through smoother neighbour interactions.

Consumer consent for unlooping if done widely in their area

Evidence suggests that consumers are more likely to consent to unlooping if others in their area are also being unlooped. Several DNOs mentioned during interviews that unlooping on a street-by-street basis is more efficient, as neighbours tend to agree more quickly and willingly. One DNO noted that consumers feel “less hard done by” when they see the same work happening to their neighbours. This approach is part of a proactive strategy currently used by two DNOs, with other DNOs planning to adopt it later in RIIO-ED2 or RIIO-ED3.

Benefits of unlooping influencing consumer views

This research question explored what consumers perceived to be as the benefits of unlooping, and whether these influenced consumer views on process. Focus groups were used to help identify the benefits from those that have been unlooped and those that have not. The key benefits to unlooping that were identified, in order of importance to survey respondents were:

- Making it easier to adopt EVCP or heat pumps
- Future-proofing your property
- Enhancing property value or appeal to future buyers/renters

There were additional benefits suggested in both survey respondent groups, these included:

- cost savings
- environmental benefits
- technological progress
- independence from shared infrastructure
- property safety
- meeting consumer needs

A few respondents were unsure about unlooping benefits, and one participant noted that they saw no benefits at all, which may stem from a lack of understanding of unlooping and LCTs, or a broader lack of engagement with or support for Net Zero.

LCT owners were asked if their unlooping experience would impact their likelihood of recommending a heat pump or EVCP to others. This question intentionally excluded other factors, such as cost savings, to isolate the impact of the unlooping process. Encouragingly, the results showed that the unlooping experience was not a deterrent. A significant majority of respondents (70%) stated they would "definitely" recommend these technologies based on their unlooping experience, with another 23% "probably" recommending them. Only a small minority (3%) were unsure. This indicates that the unlooping process, despite potential disruptions, can contribute to a positive customer journey towards LCT adoption as the overall experience of unlooping is not detrimental enough to discourage customers from recommending LCTs. While the results are positive, there is still room for improvement. The 3% who were unsure about recommending LCTs based on their unlooping experience indicate that some customers may still face challenges or have concerns that need addressing.

Proactive unlooping encouraging LCT adoption

The survey explored customer attitudes towards proactive unlooping and its impact on LCT adoption, such as heat pumps and EVCPs. Overall, 43% of respondents indicated that proactive unlooping would increase their likelihood of adopting LCTs, compared to only 6% who felt it would decrease their inclination. This suggests a positive influence on customer perceptions of LCT adoption, with 51% remaining neutral or unsure. Notably, survey results revealed that proactive unlooping was particularly appealing to consumers already possessing LCTs or those aware of looped connections. This is likely due to the removal of barriers such as shared connections, a reduction in administrative burden, and a decreased risk of neighbour disputes, all of which contribute to a more favourable environment for LCT installation.

To support proactive unlooping, survey respondents were asked about their willingness to pay £30 more per year on their energy bills to ensure all households are unlooped by 2035. Most respondents (56%) were not in favour of the idea, with 27% definitely not willing and 29% probably not willing to pay the additional £30. Some were willing to pay however, with 18% stating ‘yes probably’ and 6% ‘yes, definitely’. 20% were unsure or needed more information. This suggests that there is some but limited public support for funding unlooping through a direct increase in energy bills.

Conclusions

The electricity grid in GB faces a significant challenge with an estimated 3.9 million looped connections, representing 14% of total household connections. This issue, if not addressed proactively, could hinder the UK's transition to a low-carbon economy by limiting the adoption of essential technologies like heat pumps and EVs. However, DNOs face data challenges and varying levels of confidence in the available information, meaning the true scale of the issue remains uncertain. Incomplete records make it difficult to plan effectively and address the unlooping challenge in a timely and efficient manner.

The current rate of reactive unlooping is insufficient to meet future anticipated demand. The unlooping process is clearly not appropriate for mass heat pump and EVCP deployment, particularly in distressed situations where urgent replacements or upgrades are needed. Without a significant increase in unlooping rates, the UK's Net Zero transition could be hindered as houses may be prevented from decarbonising.

The process of unlooping constitutes an additional step in the installation of LCTs for households connected to an existing looped electricity supply, thereby extending the overall installation timeline. While evidence indicates that the need for unlooping generally results in only minor delays, there have been instances where it has caused significant delays or even led to the abandonment of installations. As such, unlooping may represent an obstacle to the efficient rollout of LCTs. This issue is likely to be particularly significant in the context of heat pump installations, as heating system replacements are frequently undertaken under urgent and time-sensitive circumstances.

Overall, the current approach to addressing looped connections is primarily driven by reactive unlooping with some pockets of proactive unlooping occurring, although proactive unlooping will continue to increase in RIIO-ED3. A reliance on reactive unlooping has the potential to lead to a wave in unlooping demand in parallel with a peak demand for LCT installations. There were divergent views from DNOs on whether this could lead to resource constraints within their operational areas, some believing it could, with others believing it could be managed.

In terms of reactive unlooping there is not a consistent approach across different DNOs, meaning that installers working in various parts of the country may need to follow different processes and face differing service expectations. Several DNOs will not allow connection of an LCT until unlooping has occurred whilst others allow connection of the first LCT on a loop without unlooping. In this scenario, some DNOs will allow connection, but schedule in later unlooping of that property to better manage its pipeline of work. Others however will only unloop when a second property requests to install an LCT on the same loop. This may have the potential to also contribute to a wave of unlooping requirements at some point in the future.

One reason for this approach of delaying may be partly due to skills shortages mentioned by two DNOs. There is a shortage of line workers, SAP level contractors, jointers and other contractors needed to carry out unlooping works. There is also competition for contractors internally within different arms of DNOs.

Proactive unlooping may be limited by data availability/accessibility. The DNOs that are successful at proactive unlooping have quality digital records of their looped connections; and are also able to link this with data on neighbourhoods likely to adopt LCT technologies. These digital data records are not consistently available for DNOs or within the regions operated by any single DNO. Notably, the one DNO that is proactively unlooping reported that the average cost of proactive unlooping is lower than that of reactive unlooping.

In terms of technologies, whilst the use of load limiters and cut-out fuse upgrades can provide interim solutions, they are not a long-term solution when multiple properties on a loop install multiple LCTs. The solutions that resolve the issue are to fully unloop, partially unloop or install feeder pillars. However partial unlooping and feeder pillars are only effective in certain circumstances. Partial unlooping is typically only used for loops no greater than two properties, or the last property on a loop, as it relies on the capacity of the shared service cable. Feeder pillars are only relevant to EVCP installations.

Moles can be used in specific circumstances to help lay the cables when unlooping or partial unlooping occurs. This avoids the need for open trenches, resulting in minimal disruption to the surrounding environment, making it a faster and easier process, but at present is more costly than traditional trenching for reactive unlooping.

The results of the consumer survey, DNO interviews and focus groups show that consumer attitudes to unlooping are varied. There is a distinct lack of understanding toward looped connections, the benefits of being unlooped, the steps involved to be unlooped, and associated disruption timeframes due to the works. This leads to a considerable proportion of consumers being concerned about going through the process, and for some this has a negative impact on their views on LCT adoption. However, the views of those that have been through the process are generally more positive about their experiences and plans for future LCT adoption – indicating pessimism bias amongst consumers about unlooping.

Whilst concerns about the impact on neighbours was identified as a key customer concern, neighbour disputes appear to only impact a small percentage of unlooping projects (the survey found less than 5% of respondent reported uncooperative neighbours). When disputes do occur however, they can cause significant delays and require a disproportionate amount of DNO resources (including legal resources) to liaise with customers and resolve. As the number of unlooping cases increase, the number of disputes is likely to increase proportionally. This could be mitigated by implementing whole-street proactive unlooping, where third-party coordination can help reduce individual disputes, as one DNO has found.

Proactive unlooping for consumers, coupled with sufficient funding/resource for DNOs to complete the jobs, are critical factors to reduce the impact of looped connections, for both consumers and DNOs, helping to address several of the barriers discussed above.

Overall, what the networks do varies significantly. There is no consistent approach across DNOs regarding looped connections. This lack of uniformity can complicate planning and create uncertainty in addressing the unlooping challenge effectively.

Further considerations

To effectively address the challenge of looped electricity connections and facilitate the widespread adoption of LCTs, a multi-faceted approach is suggested for consideration, focusing on problem identification, strategic funding, and enhanced execution of unlooping works.

Firstly, to accurately identify the scale and nature of the problem, DNOs could conduct comprehensive mapping exercises. While some DNOs have strong digital records and are actively digitising paper records, others lack even reliable paper copies, making digitalisation costly and challenging. Given these variations, a balanced strategy is required - either improving digital records where feasible or developing robust predictive models where direct data collection is impractical. Any mapping exercises should quantify looped connections, detail their locations down to postcode level, and categorise them by property type, ensuring the most cost-effective and accurate approach to identifying affected properties.

Complementing this enhanced data collection, the Government could share forward-looking insights with DNOs. This could include regularly updated forecasts of LCT uptake, disaggregated by property type and socio-economic factors. By making these forecasts accessible to DNOs, they can proactively plan network upgrades and anticipate the evolving demand for unlooping across diverse geographical areas and housing demographics.

Secondly, strategic funding mechanisms would be needed incentivise proactive unlooping. Within the RIIO-ED3 framework, Ofgem could consider establishing clear and ambitious targets for DNOs, mandating them to resolve a significant percentage of their identified looped connections within this period. This proactive target, while requiring careful calibration through cost-benefit analysis, should be sufficiently ambitious to drive meaningful progress in unlooping and demonstrably support LCT deployment.

Correspondingly, Ofgem could consider requiring DNOs to dedicate a specified portion of their RIIO-ED3 budgets to strategic unlooping programmes. These programmes should be guided by the detailed looped connection mapping and LCT uptake forecasts, prioritising areas where unlooping will unlock the greatest potential for LCT adoption and overall network capacity enhancement.

Thirdly, standards could be set for unlooping to ensure a positive experience for consumers and efficient project delivery. Ofgem could consider establishing and rigorously enforcing minimum service standards for DNOs undertaking unlooping works. These standards may encompass clear timeframes for completion, guaranteed quality of reinstatement works, proactive and transparent communication with householders, accessible dispute resolution mechanisms, and guidelines for appropriate compensation for disruption.

Furthermore, to ensure consistency and fairness for consumers, consideration could be given to establishing a standardised hierarchy of interventions for unlooping that all DNOs must follow. Currently, each DNO employs different approaches, leading to inconsistencies in service levels and timelines. A standardised hierarchy could streamline the process, reduce confusion, and ensure that all consumers receive the same quality of service regardless of their location. While standardisation is important, some flexibility can be incorporated to account for specific scenarios or regional variations in network infrastructure.

To further streamline processes and improve efficiency, the national roll-out of the Connect Direct platform could be accelerated and its functionality expanded to encompass all aspects of LCT connection applications, including unlooping. Standardisation could also extend to load calculations, with DNOs mandated to provide readily accessible and standardised methodologies and tools for installers, ensuring more accurate assessments of electrical capacity, compared to current guidance.

Fourthly, investment in skills development is crucial. Resource constraints, particularly the limited availability of SAP-level contractors and jointers could hinder unlooping programmes. Alongside investment in skills, government, DNOs, and training bodies could collaborate to promote efficient unlooping techniques, such as moling and other trenchless methods, minimising disruption. This effort could also focus on expanding training and apprenticeship programs, collaborating with education providers, attracting and retaining talent, and upskilling and reskilling the workforce.

Fifthly, recognising the specific needs of social housing residents, DNOs could implement enhanced service standards and engagement protocols. This could include dedicated engagement teams, proactive communication strategies, and procedures to minimise disruption and address potential vulnerabilities within social housing communities during unlooping works. Early engagement between DNOs and social housing associations is crucial to identify and address any unique challenges, ensuring that large scale retrofit schemes are well-informed and supported. Additionally, there could be opportunities to leverage Local Area Energy Plans (LAEPs) and Regional Energy Strategies (RESPs) to facilitate a coordinated approach, ensuring that the needs of social housing residents are integrated into wider energy transition efforts and that solutions are tailored to meet these needs effectively.

Finally, consideration could be given to establishing a dedicated cross-industry working group to actively lead and coordinate efforts on unlooping, ensuring a structured and unified approach across multiple workstreams, coordinating on key areas covered above.

Appendix: Research participants

Stakeholder Group	Organisation	Role
DNO	UKPN	Head of Connections Service Delivery
DNO	NPG	Smart Grid Development Manager
DNO	NGED	Head of Engineering Policy Connections Engineer
DNO	SSEN	Smart Energy Systems Performance Manager EV Readiness Manager
DNO	SPEN	Head of Asset Management and Investment Distribution Network Investment Manager
DNO	ENW	Head of Economic Development
Independent DNO	GTC	Electricity Networks Director
Housing and landlord association	National Residential Landlords Association	Policy Officer
Housing and landlord association	Together Housing	Senior Manager Net Zero
Housing and landlord association	Greater Manchester Combined Authority	Senior Policy and Partnerships Officer
Trade association	Heat Pump Association	Technical Consultant
Trade association	Heat Pump Federation	Director for Growth and External Affairs
Trade association	Energy Networks Association	Head of Engineering
Regulator	Ofgem	Anonymous participant
Heat pump installer	T4 Sustainability	Managing Director
Heat pump installer	Heat Geek	Technical Specialist
Heat pump installer	Kensa	Technical Director Director of Public Affairs

Stakeholder Group	Organisation	Role
EV installer	Charge Easy	Director
EV installer	Lemac	Sales Manager
Heat pump manufacturers	Kensa	Technical Director Director of Public Affairs

This publication is available from: www.gov.uk/desnz

Any enquiries regarding this publication should be sent to us at:
Josie.Dahne@energysecurity.gov.uk

If you need a version of this document in a more accessible format, please email alt.formats@energysecurity.gov.uk. Please tell us what format you need. It will help us if you say what assistive technology you use.