A guide for electric vehicle charging

SEPTEMBER 2024

It is imperative for the UK to achieve net zero targets, and a key element of this will be the transition to Electric Vehicles. Northern Powergrid are already well underway with a program of works to create a robust EV charging infrastructure that will both fulfil our customers' needs and futureproof our network for the increased presence of Electric Vehicles on our region's roads – which we anticipate will reach 1.8m electric cars, fleet vehicles and HGVs by 2030.

We at Northern Powergrid are at the forefront of the Region's requirements and we are working to deliver charge points where they are needed.

Paul Glendinning
Director of Energy Systems

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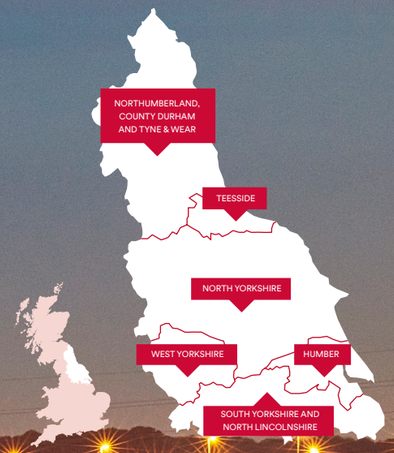
Electrifying our roads

Northern Powergrid owns and operates the electricity distribution network that powers the lives of more than eight million people across the North East, Yorkshire and northern Lincolnshire. We are responsible for the local energy network that transports electricity from the national grid to homes and businesses across our region.



Our job is to maintain a resilient and reliable network and support our regional ambition for sustainable growth by providing connections to our network.

From new homes and businesses, to renewable energy generation and electric vehicle (EV) charge points, we deliver thousands of new connections to our network every year. As our region's net zero ambition grows, so too does the demand for connections to our network.

One of the key drivers of this growth in connections is the transition to electric transport. The UK has introduced legislation that will ban the sale of new petrol or diesel cars in 2035, accelerating the growth of EVs across our region.

Our latest Distribution Future Energy Scenarios (DFES) show that up to 4.7 million EVs could be driving on our region's roads by 2050, up from around 300,000 today[1].

To support this transition, EV charging infrastructure is growing rapidly, and we are committed to enabling this rollout by developing our network to support growing demand and facilitating thousands of new connections.

1 Distribution Future Energy Scenarios 2023

Our role in the energy industry

Make it...

ELECTRICITY GENERATION

- Wind
- Renewables
- Solar
- Nuclear
- Nuclear
- Coal

Move it...

TRANSMISSION NETWORK

Moves large amounts of electricity over long distances at very high voltages

SUPPLIER

Suppliers manage energy bills, tariffs and metering. Your energy bill is paid to your supplier

DISTRIBUTION NETWORK

The distribution network takes electricity from the transmission network and delivers it to houses and businesses at a low voltage

NORTHERN POWERGRID

Northern Powergrid's Distribution System Operator (DSO) business unit is responsible for managing a smarter, cleaner and more flexible energy network

DISTRIBUTED GENERATION AND STORAGE

- Wind
- Solar
- Storage

Consumers and businesses can install generation and storage connected directly to the distribution network

Use it...

CUSTOMERS' HOMES AND BUSINESSES

- Residential customers
- Industrial & commercial customers
- Domestic generation
- Electric vehicle charging
- Heat pumps
- Smart meters
- Domestic batteries

DEMAND SIDE RESPONSE

A guide for electric vehicle charging

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How to use this guide

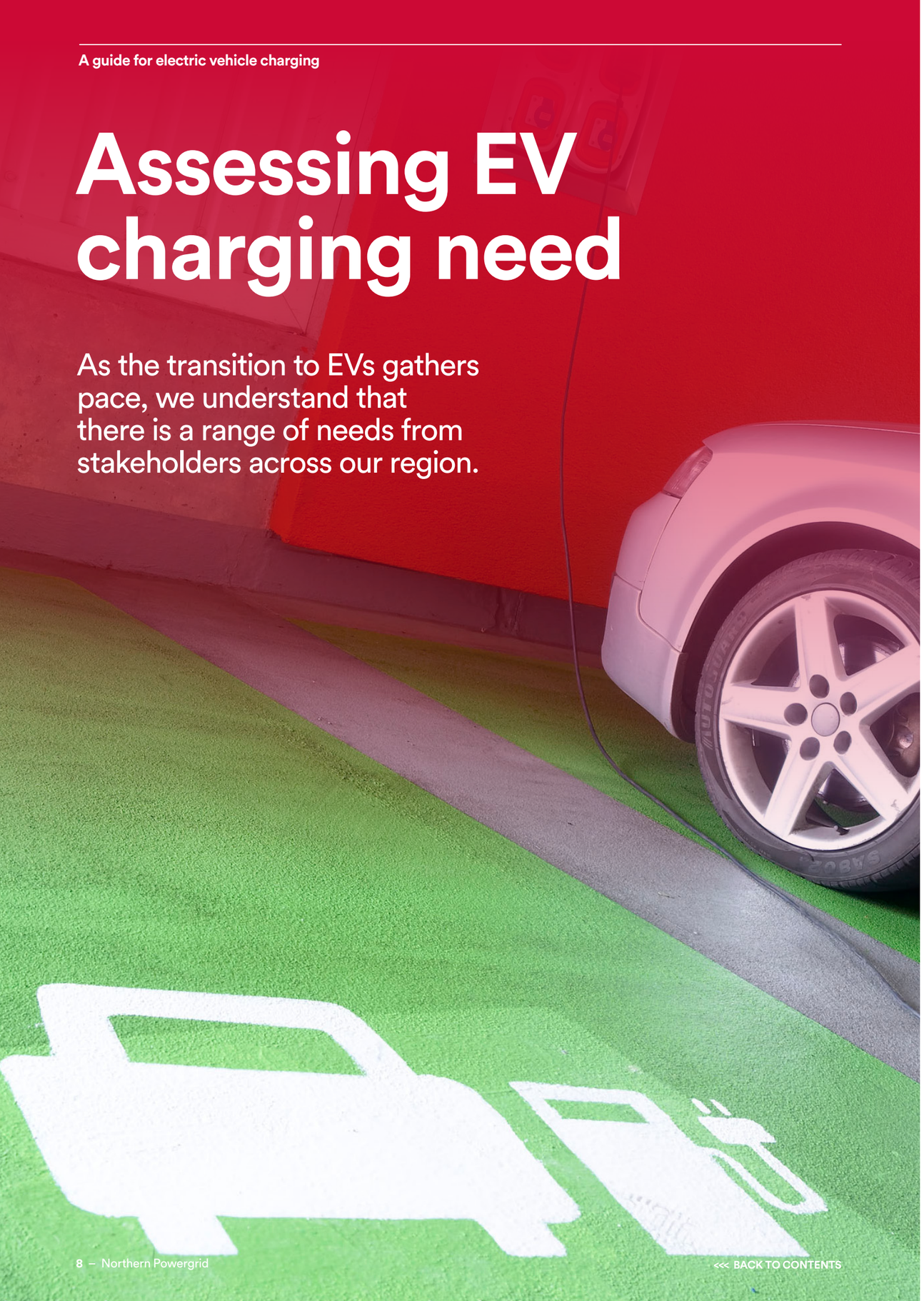
This guide is aimed at any individual or organisation looking for information about connecting EV charge points to the local electricity network.

Across the guide, there is a range of information that is relevant for different stakeholders, whether you're an individual considering switching to an EV or a local authority focussed on expanding EV charging infrastructure in a community.

Readers can navigate this guide using links throughout to find the relevant information for their specific needs.

Assessing EV charging need

As the transition to EVs gathers pace, we understand that there is a range of needs from stakeholders across our region.



Credit: Hull City Council

From individual householders seeking to install an off-street charge point to local authorities planning public charging infrastructure expansion, this section sets out key information for our stakeholder groups.

This section provides key information to help individuals and organisations assess their EV charging needs and directs them towards relevant guidance to support their planning.

Use the navigation below to select what type of stakeholder you are:

Householders

Individuals planning to make the switch to an EV and are looking to identify the best charging solution.

Organisations and businesses

Businesses and other non-commercial organisations seeking to take part in the EV transition, from electrifying fleets to installing destination charge points.

Local government organisations

Local authorities and other government bodies responsible for regional EV strategies and seeking to electrify their own fleet.

Householders

Key to delivering the transition to electrified transport is the ability for millions of households across our region to conveniently charge their vehicles at or near their homes.

For households seeking to make the switch to an EV, this section sets out the following key information for households to consider:

- Charging solutions available to householders;
- Working with an installer;
- Financial support; and
- Smart charging and flexible tariffs.

Charging solutions available to householders

Householders switiching to an EV should consider whether their home has off-street parking, whether they can safely charge their car on the street in front of their home, or whether they will need to use public charging networks, such as on-street charge points.

Below are the primary charging solutions for households.

At home charge point

If a household has access to off-street parking or permission from their local authority for cross pavement charging, they can install an EV charge point at the premises.

- **Off-street parking residential charging:** if you have off-street parking at your premises then you can install a charge point and charge your vehicle on the driveway.

  EV charge points for households range from slow chargers, which are suited to charging vehicles for long periods such as overnight, to fast chargers, which can add charge more quickly.

  Generally, slow chargers are cheaper to install and cheaper to charge your vehicle with. Householders considering an EV charge point should consider their specific needs and use patterns for the vehicle, to select the most suitable solution.

- **Cross-pavement charging:** households without off-street parking but with nearby on-street parking may wish to explore installing an EV charge point at their property with a cross-pavement charging solution such as a cable gulley. Those exploring this solution should liaise with their local authority, who are responsible for granting permission to cross the footpath.

Public charging networks

For households without off-street parking, on-street charging infrastructure might be available near to the property.

- **On-street residential charging:** is provided by local authorities or third-party charge point operators who use streetlight or pillar units at the kerbside. These charge points offer communities charging solutions on residential streets. They often deliver power slowly and are therefore more suited to charging vehicles for longer periods, whether during the day or overnight.

  Householders looking for information about installed on-street parking infrastructure or planned projects in their local area should contact their local authority.

- **Off-street public charging:** local authority and third-party charge point operators also locate public charge point infrastructure in off-street locations, such as public car parks.

  These charge points generally have the ability to deliver power faster, which is suited to charging vehicles more quickly.

Householders can find out more about public charging network locations using map apps on their smart phone or computer, or through trusted third-party apps such as Zapmap.

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Householders

Working with an installer

Householders installing a charge point should appoint a reputable installer to complete the work on their behalf. It is common practice for the installer to complete all Northern Powergrid application forms on behalf of their clients.

The installer will be required to comply with Northern Powergrid's policies and regulations for connecting low carbon technologies to the electricity network.

For more information for householders about working with installers, and for installers working on Northern Powergrid's network, click here.

Financial support

Households planning to make the switch to an EV may be entitled to financial support from the Office for Zero Emissions Vehicles (OZEV).

Grants currently available for residential properties include:

— **Charge point grant for renters and flat owners:** available to renters and flat owners with private off-street parking installing a charge point.
Click here for more information.

— **Charge point grant for households with on-street parking:** available to renters or homeowners installing a cross-pavement parking solution, with relevant permissions from the local planning and highways authority.
Click here for more information.

— **Charge point and infrastructure grant for landlords (including car parks):** available specifically to landlords seeking to install charging solutions at their properties. Grants for multiple properties and car parks are available.
Click here for more information.

Flexible tariffs

Householders with a charge point installed at their premises may be able to take advantage of time-of-use tariffs from their electricity supplier, which could reduce the cost of charging the vehicle.

For households signed up to a time-of-use tariff, the cost of electricity increases and decreases based on key factors including wider demand on the network and how much electricity is being produced at one time.

Charge point manufacturers now sell 'smart chargers' that can connect to the internet, enabling households to participate in 'smart charging'. An example of smart charging would be setting the EV charge point to charge the vehicle automatically during periods when electricity prices are low.

For more information on this topic, we recommend visiting the Energy Saving Trust's dedicated smart charging webpage, which offers an impartial introduction to smart charging solutions.

Bi-directional charging

Smart charging can also enable EVs to be used as battery storage, using bi-directional EV charge points that allow householders both to charge their EV's battery and draw power from it.

Bi-directional charging is also known as vehicle-to-grid (V2G) or vehicle-to-home (V2H). The differences between the two are:

V2G: when the power in your EV's battery is dispatched to the local electricity network during periods where additional capacity is required.

V2H: when the power in your EV's battery is dispatched to power your household.

Any households considering bi-directional charging solutions should refer to instructions from the manufacturer of their EV and EV charge point to ensure they are following the correct guidance and maintaining their equipment correctly e.g. remaining within suggested discharge limits.

Bi-directional charging is not yet widely deployed, but we are expecting it to quickly grow as the technology develops and have therefore evolved our policies to ensure that we are supporting households in the region to take advantage of smart charging solutions.

Installers who are connecting a bi-directional EV charge point to our network must ensure that they are following the correct process to keep our Connections team informed.

The Energy Networks Association has a Live Device Register online, which includes tested and approved bi-directional EV charge points. You can access the Live Device Register on ENA Connect Direct here.

Installations of bi-directional EV charge points for single premises still use the EV charge point and heat pump connections form (Form v3.4). When completing the form, the installer must select which EV charge point device they are installing.

If the device is not listed on the ENA's Live Device Register, the installer must complete additional forms to ensure the device complies with EREC G98 (Form A2-1 or A2-2 or A2-3 (as appropriate) should be submitted to the DNO).

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Organisations and businesses

Across businesses, public sector organisations, community groups and charities there are a variety of EV infrastructure needs, as organisations seek to decarbonise their fleets and provide charging infrastructure for their customers and employees.

This section sets out the key considerations for organisations considering the transition to EV's and provides supporting information on:

— Charging solutions available for organisations; and

— Financial support.

Charging solutions available for organisations

For organisations installing charging infrastructure, the nature of how the charge point will be used is key to picking the most suitable solution.
Types of charge point use include:

- **Employee charging**
- **Destination charging**
- **Charging hubs**
- **Fleet electrification**

Credit: Hull City Council

Employee charging

As more drivers make the switch to EVs, some organisations are seeking to offer EV charge points in private car parks. The needs of an organisation's employees will be a key consideration when deciding the most suitable charge point solution.

For organisations whose employees are parked on site for several hours, slow chargers may be sufficient. However, organisations that need more rapid charging requirements or parking facilities that are shared with customers may choose fast charging solutions to provide more flexibility.

Destination charging

Destination charging refers to EV charge points that are located at sites that people drive to anyway, for example:

Supermarkets **Retail parks** **Hospitals** **Park and rides** **Tourist attractions**

Organisations seeking to install destination charging at their site should consider the driving behaviours and needs of visitors when selecting the most suitable charge point solution.

For example, sites where vehicles are likely to be parked for less than two hours, such as supermarkets, may opt to install fast or rapid charge points to offer drivers a charge over a short period of time. On the other hand, for park and ride car parks – where EVs are likely to be parked for longer periods – slow charge points may be sufficient.

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Organisations and businesses

Charging hubs

EV charging hubs are sites dedicated to providing charging infrastructure for EVs – much like petrol stations and motor service areas provide fuel to petrol and diesel powered vehicles.

These charging hubs are often located at:

- Existing motorway service areas, serving major roads;
- Dedicated sites denoted as charging hubs;
- At petrol stations serving more localised needs; and
- Public car parks.

Charge point operators seeking to develop a new charging hub in our region will almost certainly require a high-capacity network connection. We would therefore recommend early engagement with our Regional Insights and Connections teams to discuss your charging hub plans.

Click here for more information about connecting larger hubs or rapid charge points.

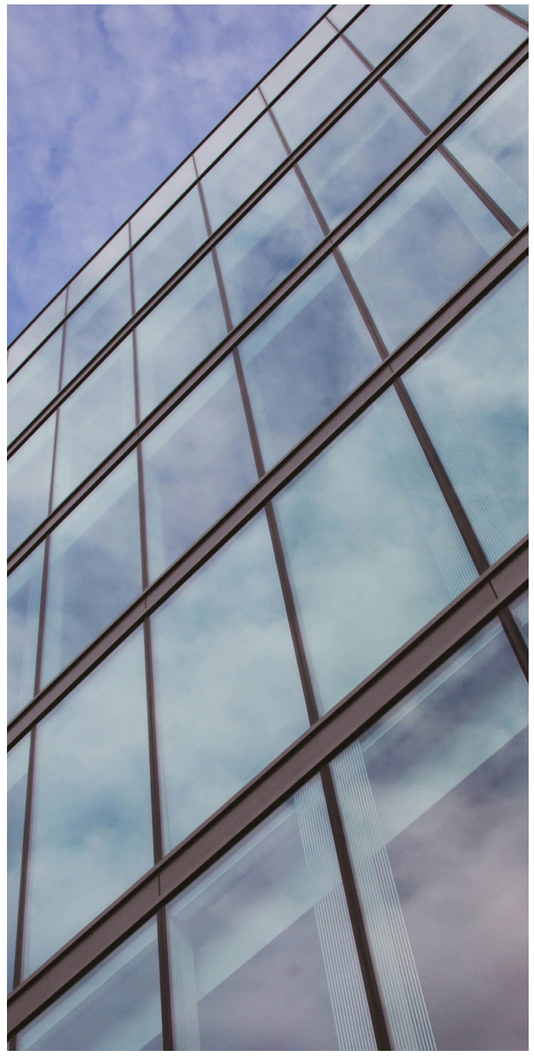
Credit: FastNed

Grant funding

The Office for Zero Emission Vehicles (OZEV) provides grant funding for businesses and organisations seeking to install charging infrastructure to support the EV transition.

When considering plans, organisations may wish to check their eligibility for any of the following OZEV grant schemes:

- **Charge point and infrastructure grant for business staff and fleet car parks:** available to small and medium-sized businesses to support with the costs of charge point installations. To be eligible, organisations must install at least one charge point and make at least five car parking spaces charge point ready. Click here for more information.
- **Workplace Charging Scheme:** available to businesses, charities, public sector organisations and small accommodation businesses, to support with the cost of up to 40 charge point installations. Click here for more information.
- **Workplace Charging Scheme for state-funded education institutions:** available to state-funded schools and education institutions to support with the cost of up to 40 charge point installations. The grant is delivered through a voucher code. Click here for more information.



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Organisations and businesses

Fleet electrification

A key consideration for businesses and organisations in our region is the electrification of fleet vehicles. Installing charging infrastructure at premises is critical to ensuring fleet operations can switch to EVs while continuing to operate smoothly.

Organisations who are operating fleet vehicles across our region and planning their transition to EVs and/or electric heavy goods vehicles (eHGVs) are advised to engage with our Connections team early in the planning stage, particularly if large numbers of charge points are planned.

Picking the right charging solution will depend on some key considerations:

Fleet size

The size of the fleet will dictate the amount of charge points required. A small fleet may only require one or two chargers – a large fleet may require significantly more charge points.

Type of vehicle

Operating smaller EVs (e.g. passenger cars) means slow or fast chargers may be sufficient for charging needs, depending on the pattern of use. However, larger vehicles, like eHGVs or electric refuse trucks may require higher capacity chargers (e.g rapid/ultra rapid) to support fleet operations.

Pattern of use

How the fleet is operated will also impact the number and type of charge points required. Fleet operators should consider driving patterns of their fleet alongside the range of their vehicles when planning EV charge point infrastructure for effective operation.

Number of locations

If a fleet operator is seeking to install EV charge points at multiple locations as part of its fleet electrification plans, this may impact planning and delivery. Projects installing charge points at multiple locations may choose to use our bulk application process. See more information about the process below.

Bulk applications process

For organisations and installers seeking to install EV charge points in multiple locations, there is a specific application process.

This form is specifically designed for the mass installation of EV charge points and heat pumps. The form can be downloaded from the ENA website here and contains additional guidance for how to complete the document.

> **The electrification of our fleet and installation of our own charging infrastructure is hugely important to Northern Powergrid as we look to decarbonise operations on our path to Net-Zero. Since we first installed depot based chargers in 2020, we now have 38 EVs and 19 PHEVs on fleet, with a plan to reduce CO2e emissions associated with the operational fleet by approx 30% by 2028.**
>
> **Ben Anstee**
> Fleet Decarbonisation Manager

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Local government organisations

Local government organisations and other public bodies across our region have responsibility for enabling the EV transition. These include:

— Developing a local strategy for EV charge point rollout;

— Delivering public charging infrastructure projects; and

— Electrifying local authority fleet operations.

Across our region, local government organisations are developing strategies for expanding EV charge point infrastructure and delivering on these strategies through installation programmes (using technologies including on-street charging and off-street public charging).

This section sets out key information for local government organisations planning for the EV transition and how Northern Powergrid can support officers with their authorities' plans. It covers:

— Strategic and collaborative planning; and

— How Northern Powergrid can support your local ambitions further.

For local authorities seeking more information on installing infrastructure at their own sites to support fleet electrification or employee charging, please refer to the organisations and businesses page for guidance.

Strategic and collaborative planning

As a key enabler of regional net zero, we want to work closely with the national, regional and local governments shaping our transition to electrified transport.

Our regional expertise, open data and responsibility for the region's electricity distribution network means we are a critical partner for national, regional and local authorities delivering strategies for electric transport in our region.

We will play a critical role in the proposed Regional Strategic Energy Planner (RESP). This body, proposed by Ofgem, is due to be implemented by the National Energy System Operator. The RESP will facilitate the development of region-wide energy strategies and involve key stakeholders including the National Energy System Operator (NESO), Distribution System Operators (DNOs) and local authorities.

We also welcome the opportunity to support individual local authorities with their plans, from specific EV charge point strategies to detailed Local Area Energy Plans.

Strategic and collaborative planning is supported across some key areas:

— Empowering planning with open data;

— Gathering regional intelligence; and

— Local Electric Vehicle Infrastructure (LEVI) funding

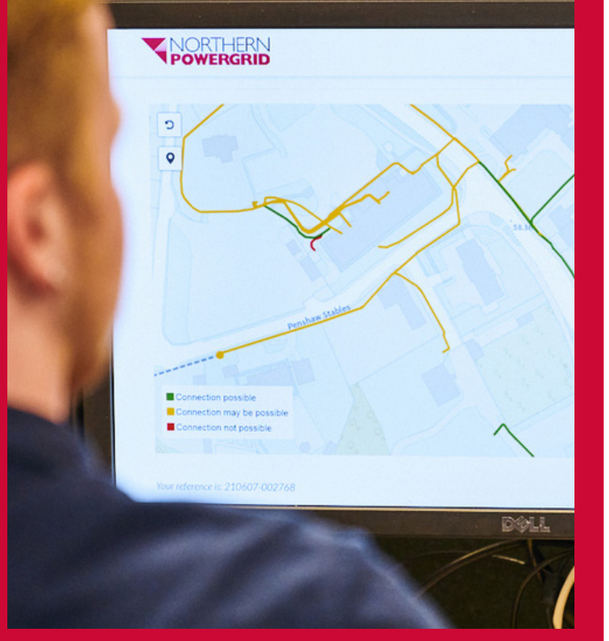
Empowering planning with open data

Our modelling and network data is a powerful tool that can support local authorities when developing their strategies for rolling out EV charge points in their communities.

The Northern Powergrid Open Data Portal has dozens of datasets available to our stakeholders. The portal also features mapping tools, enabling the layering and analysis of multiple datasets to support regional and local EV infrastructure planning.

From Site Utilisation data to our DFES, our open data and tools can help local authorities produce more effective EV strategies and plans. Our Regional Insights team are on hand to support local authority stakeholders with getting the most out of our open data offering.

Find out more about open data here. Please bear in mind you will need to create an account and log in before any data is visible within the portal.



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Local government organisations

Gathering regional intelligence

Our regular engagement with regional and local government organisations is critical to helping us to plan a future network that can support regional and local ambition for electrified transport.

We include the regional intelligence we gather from stakeholders in our DFES forecasts, which directly informs our Network Development Plan (NDP). The NDP maps out where we will invest in our network to unlock capacity for future projects.

So, if a local authority is planning a major EV project, such as expanding public charging infrastructure or supporting a local EV car sharing scheme, our Regional Insights team wants to hear about it.

Find out more about getting in touch with our Regional Insights team here.

Local Electric Vehicle Infrastructure (LEVI) funding

A key factor in regional EV planning is the LEVI fund, which supports local government organisations in England to plan and deliver charging infrastructure for residents without off-street parking.

We know that many local government organisations across our region will have secured LEVI funds and public EV charge point projects. Our Regional Insights team is on hand to support local government organisations with the planning and delivery of these projects.

Find out more information about LEVI funding here.

How Northern Powergrid can support your local ambitions further

Local government organisations are the drivers of local strategies to accelerate the EV transition – but require support from other key organisations, including Northern Powergrid, to develop strategic plans and deliverable programmes to meet their region's aims.

At the heart of the support we deliver is our Regional Insights team.

The team leads our support to local government organisations across a number of areas:

One-to-ones for programmes and strategic projects

Direct input and support from Northern Powergrid colleagues for specific programmes and strategies being delivered by local government organisations.

Delivering tutorials and explainers

Supporting training and upskilling local authority teams on Northern Powergrid tools and open data, to support more effective strategic and project planning.

Peer-to-peer knowledge exchange

Two-way information sharing, hosting meetings with local government organisations to better understand their plans and identifying how our electricity network is best placed to support these plans.

Creating materials to support stakeholder journeys

Developing guidance and information, like this EV guide, to support strategic and project planning for decarbonisation and supplementing the direct support available from our colleagues.

Collaborative planning

Working together to ensure stakeholders' plans are captured in Northern Powergrid's DFES and network development plan, and support on optioneering for future strategic projects.

Open data

Helping stakeholders to utilise our open data platform and handling requests for bespoke data packages to support specific projects.

Types of chargepoint

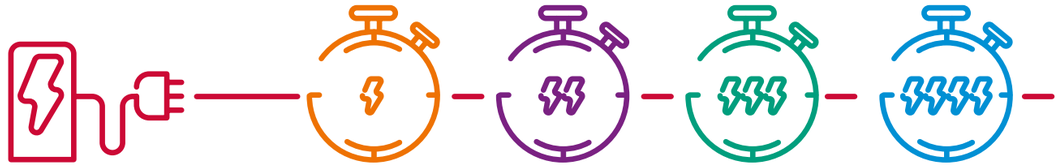
This section of our EV guidance introduces the different types of EV charge points that our stakeholders are seeking to connect to the network, their key characteristics, and most suitable use-cases. It provides information and direct links to the connections process.

Getting to know the types of EV charge points

There are a variety of different EV charge point solutions available today, to suit a wide range of needs as the transition to electrified transport accelerates.

The EV landscape is evolving quickly, with EV and charge point technology quickly changing. We have broken down the types of charge points into four indicative categories.

Definitions may vary slightly across the industry as it evolves, but these categorisations help us to explain the profiles of different charge points, where they might be used and the process for installing them to our network.



Type of charger	SLOW	FAST	RAPID	ULTRA-RAPID
Rated power	Up to 7kW	7-25kW	25kW-150kW	150kW +
Typical network connection	LV	LV	LV/HV	HV
AC/DC	AC	AC/DC	DC	DC
Charge time (0-80%)[2]	6-12hrs	2-6hrs	20mins - 1hr	< 20mins

Power rating

The power rating impacts the speed at which the charge point delivers power and therefore the capacity required from the electricity network. It also affects the required network protection for the EV charge point. More information can be found in our network protections section.

Alternating Current and Direct Current charging

A charge point can use either Alternating Current (AC) or Direct Current (DC) to charge the vehicle's battery. DC can deliver a higher power rating, which is why most rapid and ultra-rapid chargers use this method, whereas slow and fast chargers mainly use AC.

Charge time

The time it takes to charge an EV will vary depending on the vehicle and the profile of the charge point being used. The above charge time figures are rough estimates based on a medium sized electric car, but demonstrate that each charge point profile is very different and therefore likely to serve different purposes.

ENA Live Device Register

The Energy Networks Association (ENA) has a database of EV charge point devices that have been tested and confirmed as approved for use on the electricity network.

Customers do not have to select a device listed as compliant on the register. However, if the device selected is not approved, customers will have to complete additional forms as part of the application process.

You can access the Live Device Register on ENA Connect Direct here.

2 Based on a medium sized electric car with a 40kW battery.

Slow charge points

Slow charge points are the most widely installed EV charge points in the UK, servicing households, businesses and some public charging networks.

Power rating	Up to 7kW
Typical network connection	LV
AC/DC	AC
Charge time (0-80%)[3]	6-12 hours

The low power rating means they are better suited to charging EVs for longer periods of time, such as overnight or during the working day. There are different types of slow charge points:

Household

Mainly installed at households with private off-street parking. Most residential installations can use the existing connection, going through the existing connection process.

Free standing

Installed for a range of uses such as on public roads for on-street parking or in private car parks offering destination charging. Those installing at a private premises may be able to use the existing connection process. Those installing on a public highway will require a new connection to the low voltage network.

Streetlights

Mainly installed for on-street charging as part of public charging networks. Streetlights use 'unmetered connections' and therefore require a specialised arrangement. More information on connecting streetlight charging is available here.

Bulk applications process

For organisations and installers seeking to install EV charge points in multiple locations, there is a specific application process.

This form is specifically designed for the mass installation of EV charge points and heat pumps. The form can be downloaded from the ENA website here and contains additional guidance for how to complete the document.

3 Based on a medium sized electric car with a 40kW battery.

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Fast charge points

Fast charge points have a higher power rating than slow charge points and therefore can charge EV's more quickly.

Fast charge points are most likely to be owned and operated by businesses, community organisations, local authorities and charge point operators.

Power rating	7kW-25kW
Typical network connection	LV
AC/DC	AC/DC
Charge time (0-80%)[4]	2-6 hours

There are a range of different applications for fast charge points including:

Destination charging

Installed by organisations in private car parks to support customers and/or employees.

Public charging infrastructure

Provided by local authorities or charge point operators either on-street, in public car parks or at charging hubs.

Fleet operation

For operators of fleet vehicles who require shortened charging periods due to the profile of their operation.

Household

Some charge point manufacturers offer fast charge solutions for residential premises for those who require a shorter timeframe for charging their vehicle at home.

The required connection for a fast charge point will depend on where it is planned to be installed.

Existing supply

If a site has an existing three-phase supply fed from a mains cable, it may be suitable for installing a rapid charge point. However, installing multiple rapid charge points may exceed the capacity of the existing connection and require a modification and/or connecting to the high voltage (HV) network.

New connection

Those seeking to install at a site without an existing connection will require a new connection.

Public highway

Those seeking to install an on-street charge point on the public highway will require a new connection to our network.

4 Based on a medium sized electric car with a 40kW battery.

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Rapid charge points

Rapid charge points refers to infrastructure that typically has a power rating between 25kW and 150kW. The use case for these types of charge points is mainly to provide EV charging of less than an hour.

Rapid charge points draw more power from our network and therefore require a larger network connection than slow and fast charge points. It is unlikely that a rapid charge point will be required for domestic EV charging.

Power rating	25kW – 150kW
Typical network connection	LV/HV
AC/DC	DC
Charge time (0-80%)[5]	20 mins – 1 hour

There are a range of different applications for rapid charge points including:

Public charging infrastructure

Provided by local authorities or charge point operators either on-street, in public car parks or at charging hubs.

Fleet operation

for operators of fleet vehicles who require even shorter charging periods than those offered by slow or fast charge points.

Destination charging

Depending on the needs of customers / visitors, some organisations may decide to install rapid charging at their premises.

The required connection for a rapid charge point will depend on where it is planned to be installed.

Existing supply

If a site has an existing three phase supply fed from a mains cable, it may be suitable for installing a rapid charge point. However, installing multiple rapid charge points may exceed the capacity of the existing connection and require a modification and/or connecting to the high voltage (HV) network.

New connection

Those seeking to install at a site without an existing connection will require a new connection. Depending on the amount of rapid charge points being planned, the project may need to connect to our HV network.

Charging hub

Rapid charge points are often installed as part of a larger charging hub project. These sites may require a connection to our HV network. More information about connecting charging hubs to our network is available here.

5 Based on a medium sized electric car with a 40kW battery.

Ultra-rapid charge points

Ultra-rapid charge points are the most powerful charge points that connect to our electricity network and typically have a power rating higher than 150kW.

Power rating	150kW+
Typical network connection	HV
AC/DC	DC
Charge time (0-80%)[6]	< 20mins

We expect ultra-rapid charge points to be used mainly for two charging scenarios:

Charging hubs

Installed as the fastest charging facilities at charging hubs, e.g. motorway services, and some public charging locations, offering smaller EVs (passenger cars) 80 percent charge in around 20 minutes.

Fleet operation

Used to charge EVs quickly or charge much larger EVs including eHGVs.

Ultra-rapid charge points require a lot of capacity from our network and are often installed in multiples, rather than single charge points. Therefore, it requires a connection to our HV network, which can be achieved by one of the following processes:

- **New connection to our HV network:** a process that requires early engagement with our Connections team and potentially significant costs to install the necessary infrastructure.
- **Existing connection to our HV network:** if the site has an existing connection to the HV network, then it may have sufficient capacity, or will require an increase in capacity at the existing connection.

Very large projects may want to explore connecting directly to the transmission network – it is recommended quotes are sought from both the distribution and transmission networks to find the most cost-effective way to connect. We strongly recommend that developers of major projects attend a connections surgery to explore the most cost-effective solutions with our Connections team.

More information about connecting charging hubs and ultra-rapid points to our network is available here.

6 Based on a medium sized electric car with a 40kW battery.

Getting connected

One of our most important jobs is connecting people to the electricity network. Our Connections team are responsible for new connections and additional load requests to our network.

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The transition to EVs is a key focus for our Connections team and there are a number of different processes in place to support EV projects of varying size and scale to connect to our network.

This section sets out the various processes required to connect a range of EV charge points to our network. These are split into:

Existing connections

New connections

NEEDS
TYPES
CONNECTIONS
TOOLS
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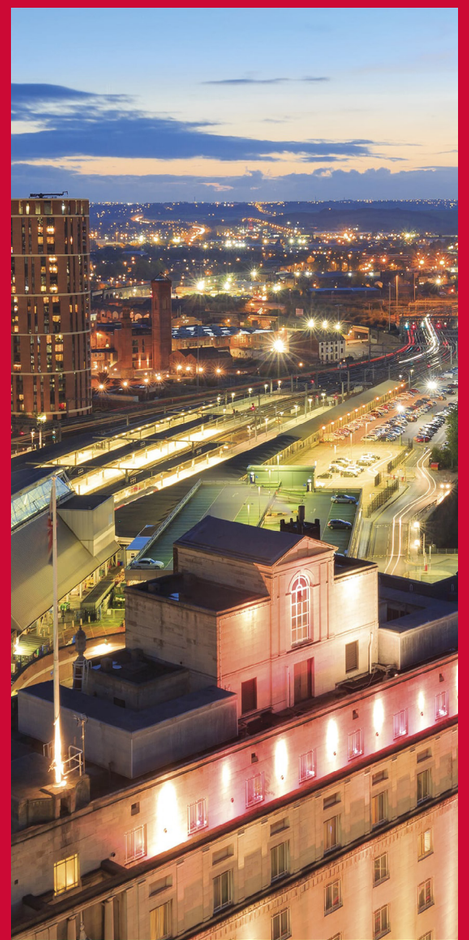
Existing connections

Any individual or organisation seeking to connect an EV charge point at an existing connection will be required to submit an application with Northern Powergrid.

In some cases existing connections will have sufficient capacity for the charge point, however in other cases modification may be needed prior to installation.



Modifying connections

Where existing connections do not have sufficient capacity to install an EV charge point, a modification to the connection is required.

Once the installer has completed the assessment of the existing power supply and deemed the existing supply insufficient, they will complete an application to modify the connection and increase the supply. This form can be downloaded here or completed online.

In some cases, households will be eligible for their connection to be modified free of charge by Northern Powergrid. Households are likely to be eligible if:

— They require a fuse upgrade to allow the EV charge-point to be connected to their supply; and/or

— Their property is connected to a looped service that requires replacement with a direct supply.

Individuals or organisations are required to provide the appointed installer with a letter of authority, indicating their permission to act on their behalf.

Once the application is submitted, we will undertake a pre-quote site visit (if required) and prepare a quotation for the work. Once the individual or organisation has received the quotation, they will need to return a signed acceptance and payment.

Finally, Northern Powergrid will work with the appointed installer to schedule and complete the required work. Please note that to ensure safe operation only Northern Powergrid can undertake work to upgrade existing network connections.

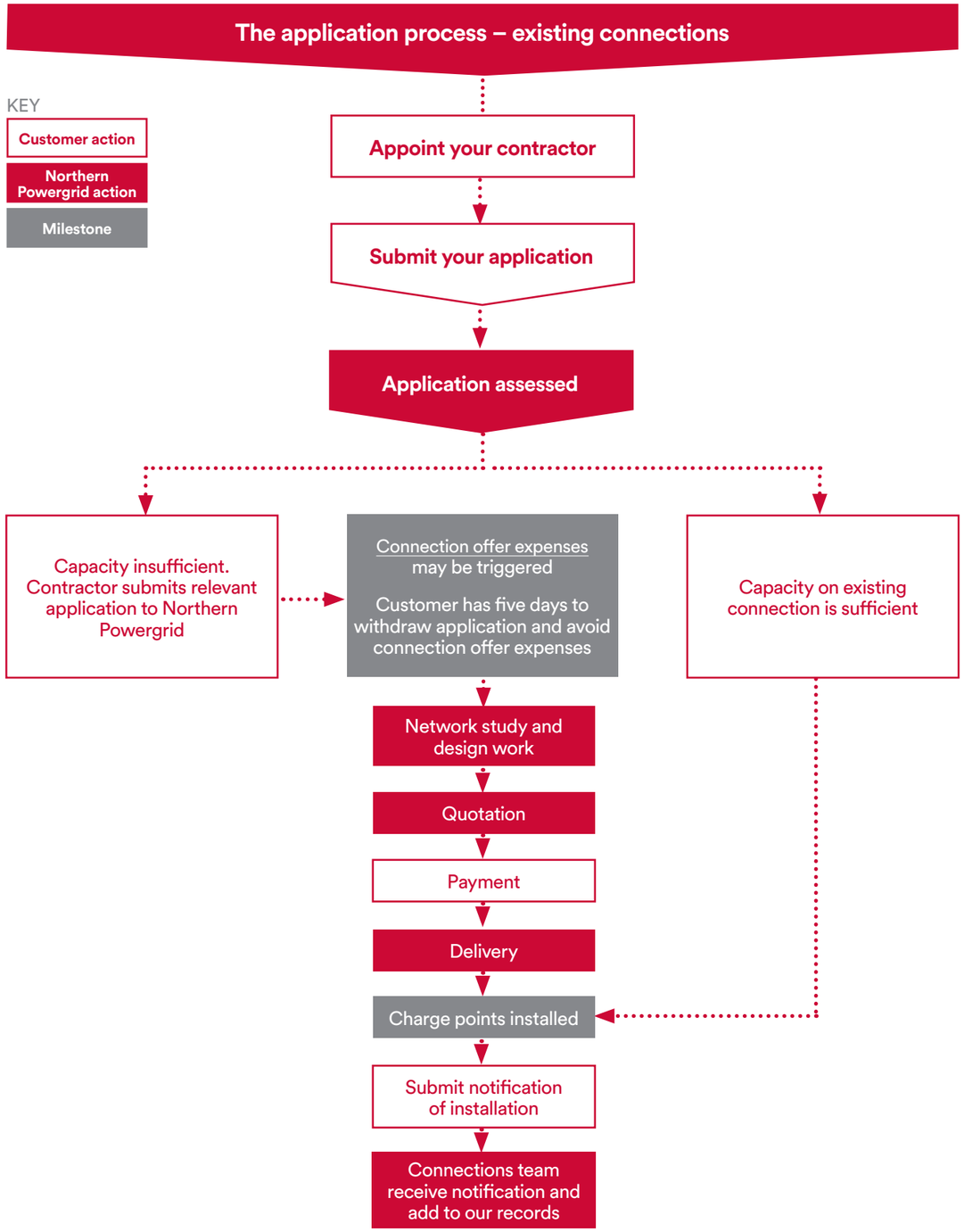
Cut-out and fuse information

Click here for more information on Northern Powergrid's rules and regulations on cut-outs and fuses.

Cost and timelines

The cost and timescales for connecting to our network will depend on the characteristics of the project, but indicative information is available to help with your project planning.

The application process – existing connections



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New connections

For those seeking to install EV charge points at a site where an existing connection does not exist, a new connection to our network is required.

If the site does have an existing connection, Northern Powergrid will only provide a new connection if the customer seeking the new connection is a third-party leasing land at the boundary of the site. Otherwise we will require the existing connection to be used. More information on the requirements can be found here.

New connections for EV charge point projects can connect to our low voltage (LV) network or our high voltage (HV) network, depending on the profile of the project.

When applying for new connections to Northern Powergrid's network, individuals and organisations have a choice about who carries out a proportion of the work on their behalf. Many new connections are 'contestable works' and Independent Connection Providers (ICP) can deliver this work.

The process, cost and timescale for a new connection will vary depending on a number of factors including the location of the project and the required capacity. Our cost and timescales guide provides estimates for different types of project.

Cost and timelines

The cost and timescales for connecting to our network will depend on the characteristics of the project, but indicative information is available to help with your project planning.

Learn more about contestable and non-contestable works here.

For many EV charge point projects seeking to connect to our network, land rights and wayleaves are critical to the successful application and delivery. Find out more information in our Land Rights and Wayleaves section.

The application process – new connections

KEY

- Customer action
- Northern Powergrid action
- Milestone

- Appoint your contractor
- Submit your application
- Network capability assessment
- Connection offer expenses may be triggered
- Customer has five days to withdraw application and avoid connection offer expenses
- Network study and design work
- Quotation
- Payment
- Delivery
- Charge points installed

Processes for specific EV charge point projects

On-street and car park chargers connected to the low voltage network

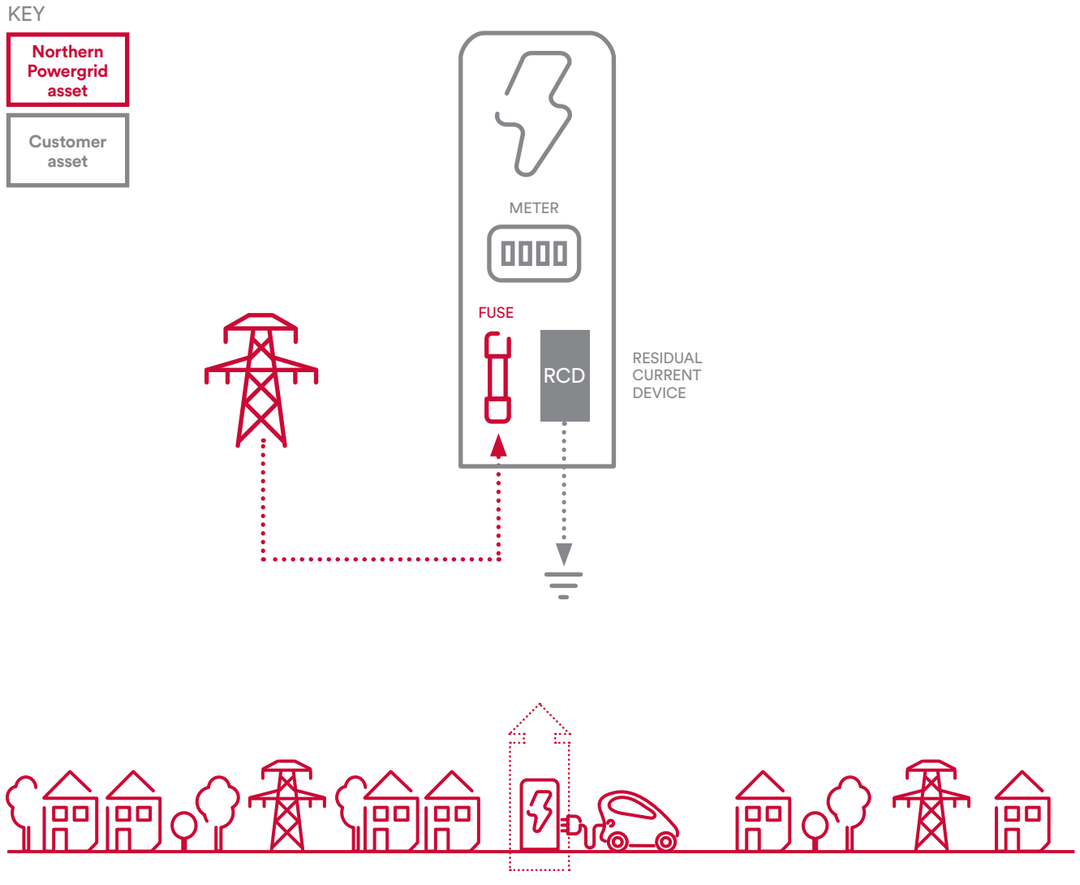
If you're looking to install on-street or car park charge points, this section details some of the important considerations.

Installing on-street

Charge points can be installed at on-street locations with the installation of an EV charge point to a supply pillar.

The pillar should be provided, owned and maintained by the customer. The pillar must be secure and be suitably ingress protection rated to safely house a Northern Powergrid cutout and whole current meter.

All public charge points must adhere to our network protection requirements. More information can be found here.

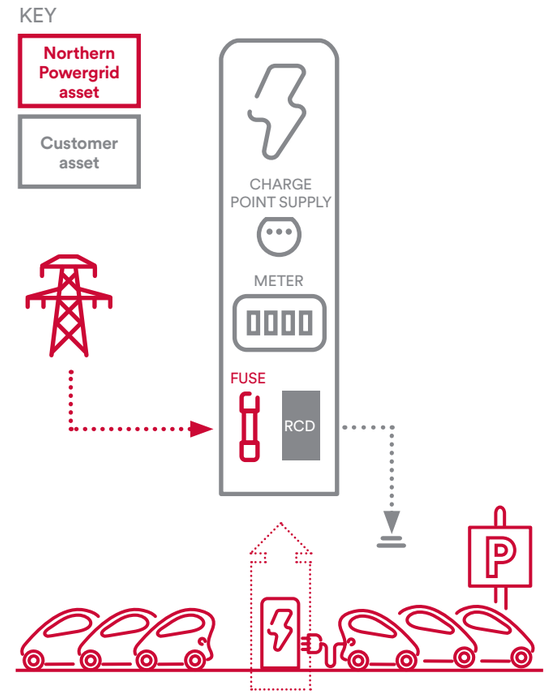


Installing in car parks

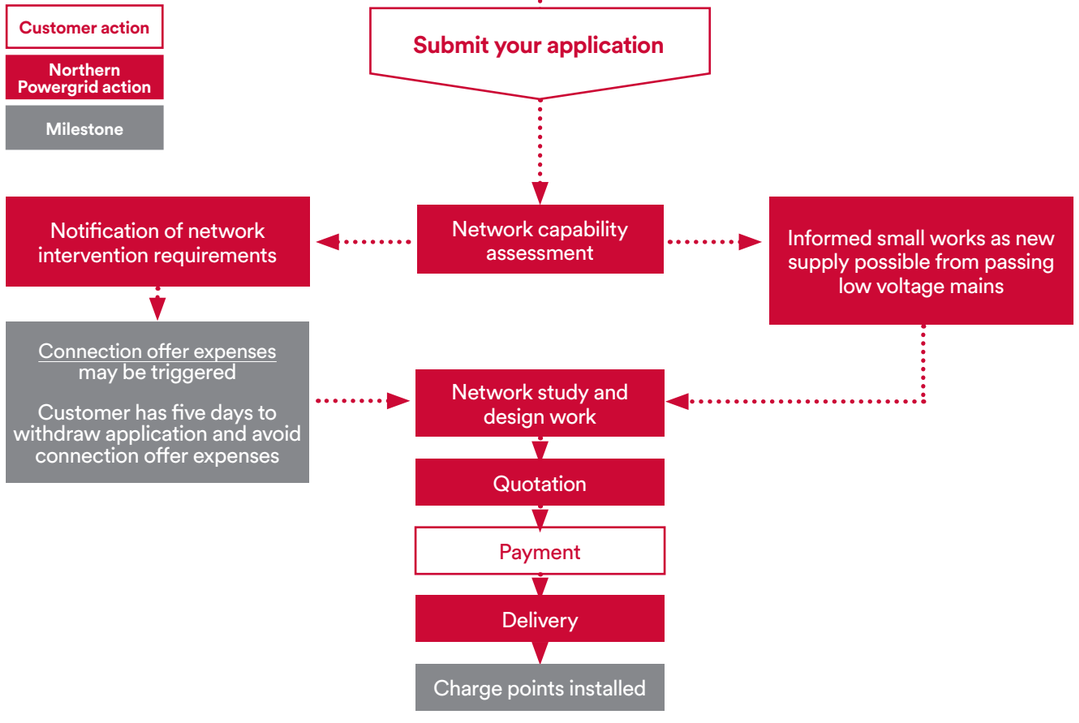
Charge points installed off-street in public locations, such as car parks, will have different requirements to installing on the public highway. More information on the specific requirements for public charge points can be found here.

The new connection can sometimes be provided via the existing supply – but only in certain circumstances. The installer will need to liaise with our Connections team if they believe an existing supply can be used without requiring an upgrade.

All public charge points must adhere to our network protection requirements. More information can be found here.



The application process – on-street and carpark chargers



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Processes for specific EV charge point projects

Streetlight based chargers (unmetered connections)

Streetlight-based chargers will be connected to our network via an unmetered connection.

Unmetered connections are applied where installing a meter is impractical or the metering costs would significantly outweigh the cost of electricity used. Learn more in our explainer video here.

As a result, there are important considerations that must be taken for planners and installers of street lighting chargers on our network.

Streetlight charge points must be metered via the EV charging cable using a measured central management system approved by Elexon. Therefore, a metering exemption will need to be applied for and these assets must be included on an unmetered supply inventory. More information can be found here.

All public charge points, including street light-based charge points must adhere to our network protection requirements – information for streetlight-based charge points can be found here.

All sites must be submitted for assessment. Where the connection can be made within the constraints of our standard design rules applicants will be notified that they can connect to the existing connection.

Locations that do not comply with the standard design rules will require network upgrades before being connected. Our Connections team will be able to advise on the next steps in this case.

The application process – streetlighting based chargers

KEY
- Customer action
- Northern Powergrid action
- Milestone

Submit your application

Network capability assessment

Notification of network intervention requirements
- Connection offer expenses may be triggered
- Customer has five days to withdraw application and avoid connection offer expenses
- Network study and design work
- Quotation
- Payment
- Delivery
- Charge points installed

Connection offer via Small Works Process
- Network study and design work
- Quotation
- Payment
- Delivery
- Charge points installed

Accept on existing notification
- Installer notifies Northern Powergrid of installed devices and location on the network
- Charge points installed

Processes for specific EV charge point projects

Larger hubs and/or high-capacity chargers

Large public charging hubs or high volumes of high-capacity chargers to support fleet operations are unlikely to be connected to the low voltage network.

Delivering these connections is likely to require a new substation to connect to the high voltage network, which will represent a step up in cost. High voltage cables may not be close to the site, so site selection becomes an important consideration for viability.

An on-site substation will require a building to house it, either a glass reinforced plastic enclosure or a brick building.

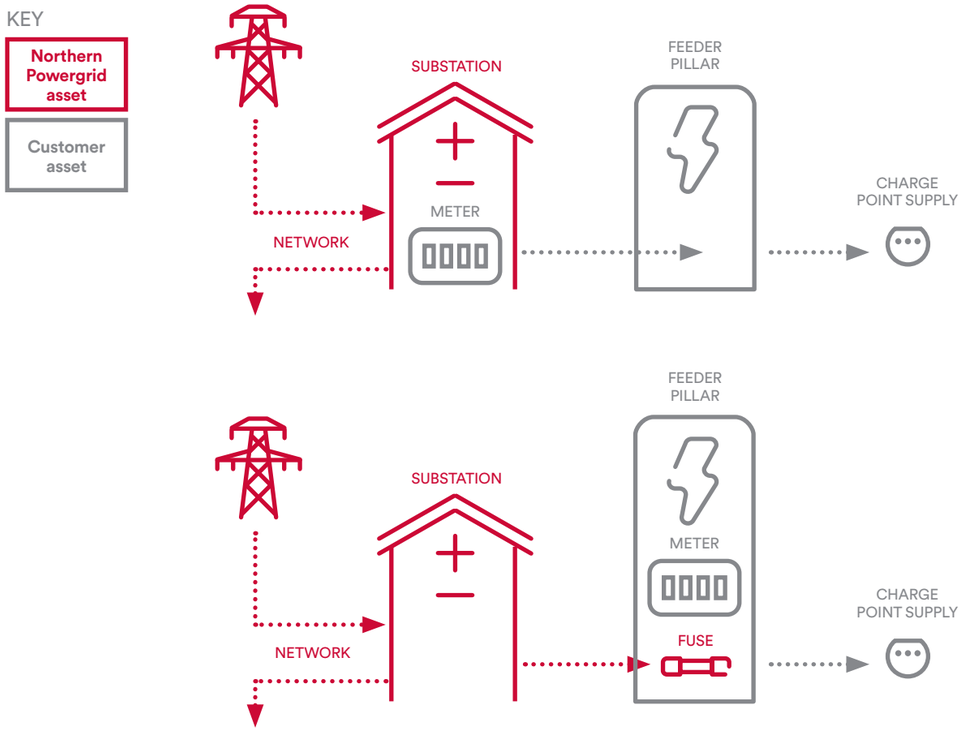
Space will need to be allocated on the site for this building and it will need to be provided by the customer as per our standards. The time it may take to obtain any planning permission, relevant permits and legal consent can be hard to predict and should be reflected in the work programme.

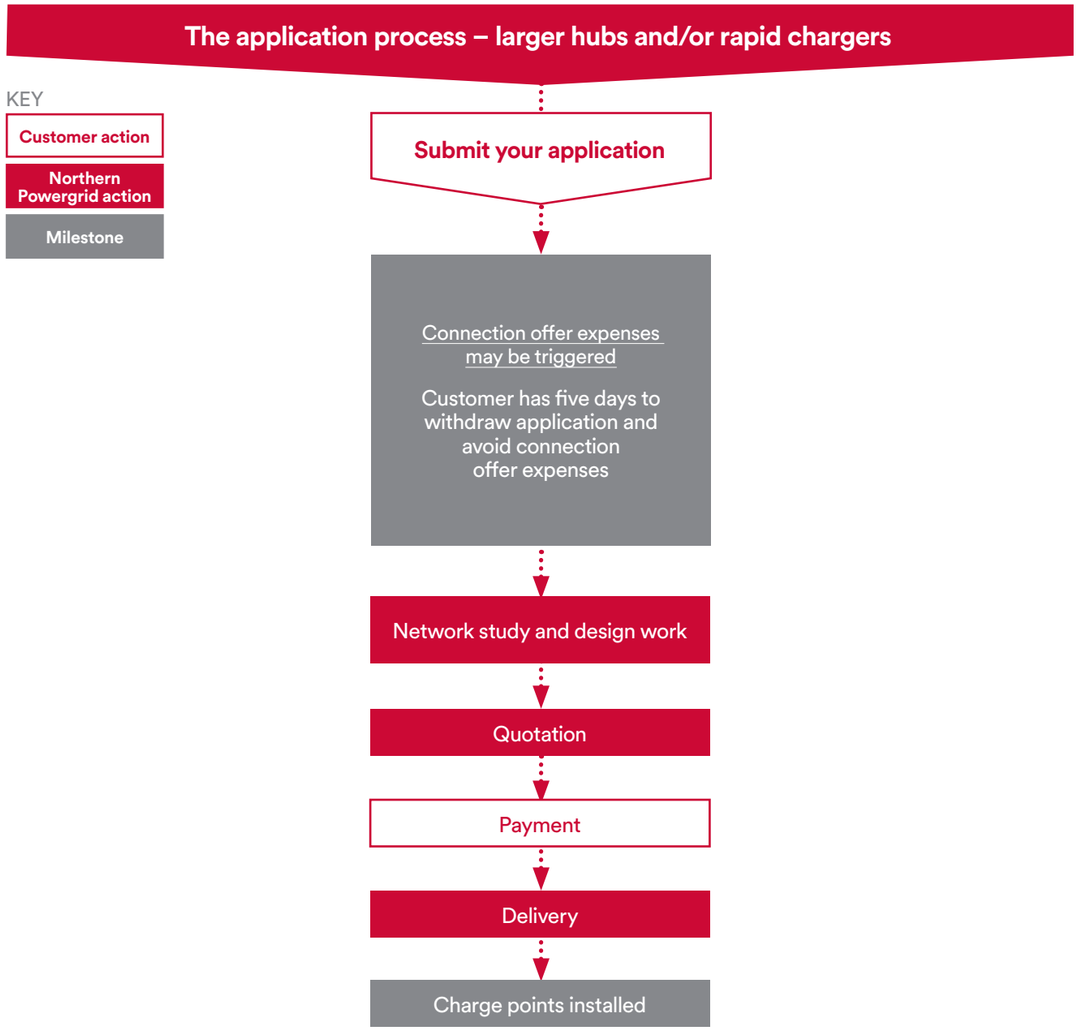
There is a variety of options for this supply arrangement, and any site wishing to provide charge points where traditional liquid fuels e.g petrol/diesel are present, will need to abide by additional Northern Powergrid policy restrictions, which are reflected in more detail here.

It's important for organisations to discuss the specific project requirements with the appointed Northern Powergrid designer.

All charge points, including high capacity chargers and charging hubs, must adhere to our network protection requirements.

Compliance with G5/5 is required for all EV charge points, and especially relevant for larger hubs and high capacity charge points. More information is available here.





Support and tools

We are committed to accelerating the EV transition and making the process of planning and connecting charge points to our network as easy as possible. To support our stakeholders, we have dedicated colleagues and tools that will support stakeholders from the first step of planning through to plugging in their EV.

A guide for electric vehicle charging

Regional Insights team

Our Regional Insights team is dedicated to enhancing collaboration between ourselves and key local stakeholders such as local government organisations, wider public sector bodies and social housing providers.

The team is on hand to support stakeholders with a range of enquiries to facilitate quicker and more efficient planning and delivery of EV strategies and specific projects by offering support, guidance and advice with:

- Understanding our network;
- Interpreting our network data; and
- Understanding our connection and planning processes.

Our team is also on hand to provide upskilling, deliver tutorials and explainers, and facilitate opportunities for stakeholders to influence our strategic network development by informing us of their plans.

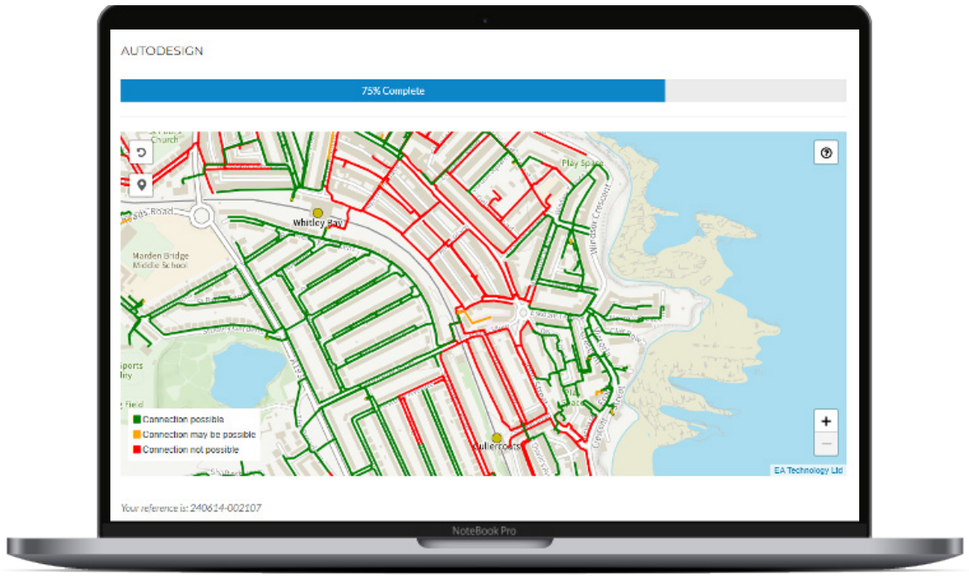
How our stakeholders can help us

As well as offering bespoke support for developing EV strategies and progressing specific projects, our Regional Insights team is committed to building long-lasting mutually beneficial relationships with our stakeholders.

We want to host regular conversations with our stakeholders about their objectives and plans, in order to improve our regional intelligence. This directly informs our forecasts such as our DFES, which impacts the network development decisions we take to ensure our network can support regional net zero ambitions.

To get in touch with our Regional Insights team contact us on:
LAEP@northernpowergrid.com

AutoDesign



We have developed self-service tools to support our stakeholders with their planning. One of the most helpful tools for our EV stakeholders is our AutoDesign platform.

AutoDesign is an online, self-service tool that provides free budget estimates to support stakeholders planning new projects.

The tool is aimed at individuals or organisations who are planning to install new charge points where there is not an existing connection, such as a local authority seeking to install new on-street EV infrastructure.

The tool contains up-to-date network data and enables stakeholders to identify the most viable and cost-effective locations on our network to apply for a new connection. AutoDesign will generate free budget estimates, allowing stakeholders to map the indicative cost of a new connection at multiple locations – providing comprehensive information as part of their project planning.

AutoDesign can be used for new connection(s) up to a maximum of 210kVA. That is roughly equivalent to:

— A large single load, including EV charge points, commercial and industrial premises; or

— 30 general domestic premises, each with a 7kW EV charge point.

The budget estimate indicates the cost of Northern Powergrid delivering the new connection and can be used to inform project planning. When using AutoDesign, stakeholders should note that the budget estimate does not represent a formal connection offer, nor does it take into account any associated costs relating to land rights or traffic management.

Customers will still be required to formally apply for a new connection, if wanting to proceed with their AutoDesign budget estimate.

For more information watch our Introducing AutoDesign video online here.

Connections resources

Connections team

Our Connections team is responsible for managing connections applications.

Our connections services are split into two key areas:

— New connections: supporting individuals and organisations by connecting sites to our network via new connections.

— Existing connections: supporting individuals and organisations with projects at existing connections, including notification of low carbon technology installations and applications to increase power supplies

Our online resources provides useful connections information. Our connections webpages provide a list of relevant connections services that users can click through to access further information about the service, including:

— Guidance and policy;

— A list of information required for the application;

— A flow chart of the connection journey; and

— A link to begin the application.

Alternatively, you can speak to our Connections team directly via phone, email or booking a one-to-one surgery.

Interactive guidance tool

For those who are unsure what connections service is required, this online tool asks questions about the project's profile and directs users towards the correct connections service.
Click here to get started with the interactive tool.

Connections surgeries

The Connections team also hosts surgeries for connections customers seeking pre-application support and advice. These can be booked through our Customer Events and Surgeries webpage.

Contact the Connections team

— Phone: 0800 011 3433

— Email: connections@northernpowergrid.com

Useful resources

Here are links to our online resources which customers seeking to install EV charge points may find useful.

- New connections webpage
- EV charge points connection page
- Existing connections webpage
- EV homepage

Open data

For both Northern Powergrid and our stakeholders, data is critical for painting a clear picture and modelling future trends, in order to build infrastructure in the right locations to support the energy transition.

For the EV transition, open data can provide local authorities or charge point operators with access to regional data to help identify the most suitable locations for new projects.

Tools such as our network availability heat map are useful for stakeholders planning major projects that require a large connection, such as charging hubs.

We also publish information about our planned network development, which can help organisations identify where capacity on our network is being unlocked in the future and support their long-term plans for EV charging infrastructure.

Open Data Portal

Our Open Data Portal is the central location for all of the open access data sets that we have published to support our stakeholders with their planning. Our Open Data Portal includes:

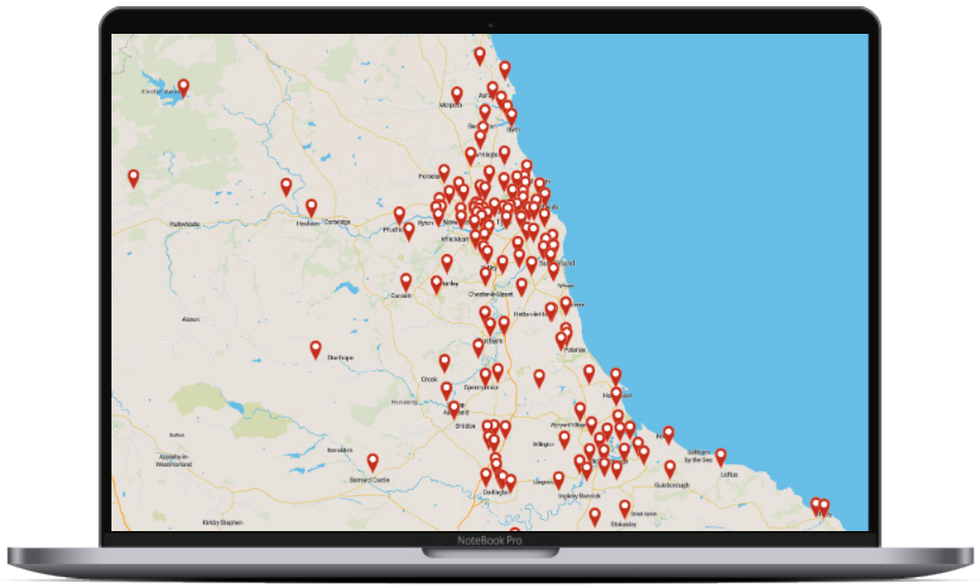
- **Distribution Future Energy Scenarios:** our modelling of different regional energy transition pathways.
- **Northern Powergrid Site Utilisation:** open data dataset indicating the utilisation capabilities of every distribution substation on our network, providing locally specific insights.
- **Network Availability Heat Maps:** self-service tool that indicates where our network has capacity for large-scale generation and demand projects.
- **Network Development Plan:** information on our planned network developments, including data sets on thermal demand and generation headroom.
- **Grid Connection Queue:** open insights into the headroom and connection queue at each of the Grid Supply Points on our network.

As well as making a growing range of data available, our Open Data Portal includes tools that help stakeholders planning their EV charge point projects to visualise and use the data. This includes:

- **Maps:** enabling stakeholders to plot data across the geography of our region. Datasets can be layered to support data analysis and planning.
- **Charts:** enabling stakeholders to plot multiple data sets on charts to support data analysis and planning.
- **Data export:** allowing stakeholders to download the raw datasets to support their own modelling or data analysis outside of the Open Data Portal platform.

We are constantly evolving our open data offering, to ensure that we are as transparent and supportive of our stakeholders as possible.

Our Open Data Portal includes a form for stakeholders to request access to data not listed on the site. Our team will consider the request and upload the data to the Open Data Portal if the request can be granted.



Appendix

Costs associated with new connections services

Indicative costs and timescales

This section sets out indicative costs and timescales for new connections to our electricity network. The table below sets out the various profiles of new connections and associated costs and timescales.

Please note that every new connection has specific characteristics which may lead to actual costs and timescales differing from those indicated below.

	Unmetered	Small	Medium	Large	Very large
Typical for EV charge points associated with	Street lighting	Domestic property	Small commercial property e.g. workplace charging	Medium commercial property e.g. motorway service area	Industrial e.g. factories and future motorway service areas
Typical connections capacity	Up to 5kW	<18kW	<55kW	<276kW (fuse) or <1.1MW (air circuit breaker)	<8MW
Typical EVCP rating	Up to 5kW	Up to 7kW	Up to 43kW	120-350kW	350kW
Average quotation time	20 days	9 – 16 days	21 days	30 – 56 days	58 – 65 days
Average time to connect (following payment)	5 weeks	10 weeks	19 weeks	19 – 29 weeks	19 – 29 weeks
Average price	**£0**	**£3,210**	**£13,160**	**£48,750**	**POA**

Who pays for network development

Delivering new connections sometimes requires work to develop our network, either to reinforce existing parts or extend it. Who pays for this cost depends on the location on the network.

In May 2022, Ofgem published its Access and Forward-Looking Charges Significant Code Review (Access SCR), which reformed how certain parties access the electricity network and how much they contribute towards the cost of reinforcing the network to enable a new connection. The changes from Access SCR came into effect on 1 April 2023 and informs the current regime.

The key change for connections customers is that in most cases, customers applying for a demand connection no longer have to pay towards the cost of network reinforcement with their connection (see graphic below).

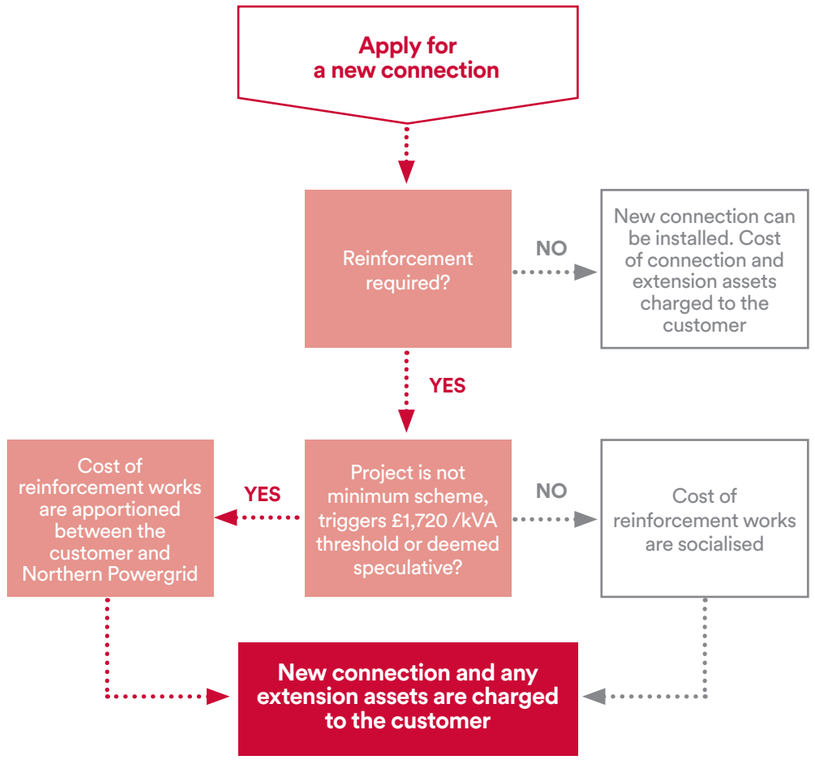
Instead, the cost of any network reinforcement upstream of the point of connection is socialised and funded through the network charges on customer bills, in the same way that other Northern Powergrid operational costs are funded.

There are some exemptions, where customers may be liable to an apportioned cost of upstream reinforcement cost:

- A project triggers a £1,720/kVA reinforcement cost threshold;
- A project is deemed speculative; and/or
- A project is not the 'minimum scheme'.

Customers are still liable to the full cost of any sole-use or extension assets required downstream of the point of connection.

Network reinforcement process – demand connections



Connection Offer Expenses

Those submitting an application for a new or modified connection should be aware of Connection Offer Expenses.

Connection Offer Expenses refer to the costs that a DNO incurs when undertaking network assessments to prepare a quote and/or connection offer for a customer. Once an application for a new connection or a change to an existing connection is submitted to our Connections team, our Design team must spend time processing the application.

Our policy is to charge some of these costs back to the applicant. The costs will vary depending on the complexity of the application.

Even if the customer does not decide to proceed with the connection offer, they are still liable for Connection Offer Expenses.

For 'small works' applications, Connections Offer Expenses are not applicable. Small works refers typically to a connection for up to four domestic premises or a single small commercial premises.

For more information, please download our Connection Offer Expenses guide.

Land rights and wayleaves

The term 'land rights' is used as a collective term to cover the acquisition of property rights, such as freehold and leasehold interests, easements or wayleaves, as well as consultations and statutory consents that may be required before connection equipment can be installed. These should be a key consideration when planning EV charge point projects, as the time taken to obtain land rights agreements can vary.

It is important to note that if a land rights agreement is required, the onus is on the applicant to ensure the owner of the land is contacted and responds to Northern Powergrid. Preferably, contact should be made with the landowner prior to any Northern Powergrid communication. If we have had no response from the landowner after 60 days, we will stop the land rights process, which will delay your application/connection agreement.

It is equally important to ensure that you (the customer) have acquired your own land rights for your point of connection and can provide proof of tenure, prior to the 'design approval stage' of the project. Early discussions and negotiations between you and your land provider are strongly advised, as this is a key requirement for your connection. Delays in acquiring your own land rights may well affect your ultimate connection date.

Any projects which involve third party land are likely to require a land rights agreement. For EV charge point projects, this includes:

- Charge points planned on an unadopted highway by a third-party operator e.g. an on-street charging operator installing a free-standing charge point on an unadopted highway. An unadopted highway is one that is not maintained at public expense by a local authority.
- Projects planned where network development on third party land is required e.g. a charging hub that requires a cable to be installed across third party land to provide a point of connection.

In addition to having permission for the installation, it is important that we have the right to remain on the land, including rights of entry to work on the equipment at any time in the future.

Northern Powergrid has a team of dedicated Wayleave Officers who are responsible for parts of the application process relating to wayleave agreements and can provide support to applicants throughout the process.

More information is available in our Guide to land rights.

Alternatively, you can contact our Wayleaves team on 0191 229 4604 or by emailing wayleaveinstructions@northernpowergrid.com

Compliance and standards

For customers appointing an installer

Any contractor installing an EV charge point must be a qualified electrician.

Though not required, we recommend using an installer authorised by the Office for Zero Emission Vehicles (OZEV) which can be found on this webpage.

The role of an installer is to advise on the best charging solution for an EV charge point project, complete the necessary applications/or and notifications with our Connections team and safely complete the installation of the charge point(s).

For installers working on our network

Adhering to rules and regulations

Any individual installing an EV charge point must be a qualified electrician.

Installers who are installing EV charge points to our network should be aware of Northern Powergrid's codes of practice for it's LV and HV networks.

It is critical that installers operating on our network adhere to the following rules:

- Keep a safe distance from Northern Powergrid; equipment when undertaking a visual assessment of the connection;
- Do not attempt to touch or interfere with Northern Powergrid equipment. Only Northern Powergrid colleagues are permitted to modify our equipment at an existing connection, with the exception of streetlighting where certified individuals may be permitted (service cable, cut-out, meter board);
- Adhere to Northern Powergrid policy on authorisations i.e. for some EV charge point connections such as street light installations, authorisations are required; and
- Ensure that any ground work for projects follows the ENA's Think Before You Dig checklist to ensure safety when working close to the network.

For more detailed information, installers should refer to our Codes of Practice documents. Relevant Codes of Practice for EV charge point installers are listed below:

- Code of Practice on Fusing
- Code of Practice for the Economic Development of the LV System
- Code of Practice for the Economic Development of the HV System
- IMP 001 010 – Code of Practice for Standard Arrangements for Customer Connections

Network protection

Single-phase domestic fuses

For installers connecting EV charge points to an existing LV connection, an assessment of the customer's existing supply at the meter is one of the first steps for planning the project. This will include an assessment of the meter's cut-out and installed fuse.

Most domestic connections have a single-phase supply. Modern cut-outs have fuse sizes of either 60A or 80A. However, cut-outs installed before 1990 are likely to be 60A or lower. For help identifying the cut-out's rating, use the Energy Networks Association's DNO Cut-out Types & Ratings Guidance.

If an installer determines a fuse upgrade is required, they must contact Northern Powergrid's Connections team to undertake this work.

For those applying for a new connection to the LV network, all new supplies are fitted with an 80A fuse as standard, which should offer households or small commercial premises enough capacity to install multiple low carbon technologies, such as an EV charge point alongside a heat pump.

In some cases, installers will find premises connected to a looped service when completing their assessments. In this case, the installer should contact Northern Powergrid's Connections team who will complete an assessment of the connection and support with the process of delivering a new, independent connection for the premises.

Three-phase supply

If the power requirements for a domestic or commercial connection exceeds 18kW then a three-phase supply will typically be installed, though devices around the upper margin will vary.

Three-phase supplies have three cables within the service cable and therefore three separate fuses, enabling an increase in power supply to the connection. For any EV charge point projects seeking to install more than one to two slow or fast charge points, three phase supplies are likely to be required.

Public charge points

All public charge points must be connected to a TT earthing system and installations must comply with Engineering Recommendation G5/5.

Installers should note that O-PEN devices are not currently approved for use in our licence area.

Any contractors upgrading fuses will need to be certified to work on our network and are not permitted to operate on our network equipment without certification.

G5/5 compliance

The harmonic impact of EV charge points on the distribution network requires assessment from Northern Powergrid.

In certain circumstances the harmonic impact a charge point can be assessed in accordance with Engineering Recommendation G5/5 via a desktop study.

However, in other circumstances, Northern Powergrid must carry out a background harmonic assessment at the point of common coupling (PCC) before the connection is energised, prior to the Electric Vehicle Charge Points (EVCP) being connected.. The PCC is the point at which an electrical connection interacts with the wider distribution system. This background harmonic assessment will take a minimum period of two weeks to complete, whilst monitoring equipment measures the existing harmonic distortion at the local network. Following this period, the customer will be sent a report detailing the existing network conditions, and they will be required to submit a post-design compliance report using this data, demonstrating how the installation complies with 'Engineering Recommendation G5/5 – Harmonics'.

If the background harmonic assessment highlights non-compliance with Engineering Recommendation G5/5, the owner of the EVCP will need to disconnect the EVCP until mitigation is fitted that brings the EVCP in compliance with Engineering Recommendation G5/5, or an alternative EVCP is installed that is compliant.

Low voltage

The maximum permissible capacity on a dedicated Low Voltage Feeder is 276kVA.

It is important to be aware that some EV charge point installations may require a background harmonic assessment. If required, an initial assessment is completed after energisation of the connection but prior to any EV charge points being in use, and will last for a minimum of two weeks. A further harmonic assessment will be needed after the EV charge points are in use, and will last for a minimum of two weeks.

All connections with a capacity above 138kVA are required to be connected via a dedicated Low Voltage Feeder.

High voltage connections

It is important to be aware that some EV charge point installations may require a background harmonic assessment. If required, an initial assessment is completed after energisation of the connection but prior to any EV charge points being in use, and will last for a minimum of two weeks. A further harmonic assessment will be needed after the EV charge points are in use, and will last for a minimum of two weeks.

G100compliance

Any installations where the capacity of the chargers exceeds the connection agreement of the site will need to comply with Engineering Recommendation G100.

For more information on Engineering Recommendation G100 click here.

Maximum permitted equipment rating

Low Voltage Connections

Calculations:

Maximum permitted equipment rating at PCC =

$$= \frac{\text{Fault Level at PCC}}{\text{10MVA x Aggregate equipment rating of the technology type installed}}$$

The aggregate equipment rating of each technology type can be found in the extract of Engineering Recommendation G5/5 below:

Table 19 — Maximum permitted aggregate equipment rated power at reference short-circuit power (1C-1)

PCC voltage	$\sum S_{equ\ permitted\ @\ Ssc\ reference}$ $S_{SC\ reference}$ = 10 MVA three-phase			$\sum S_{equ\ permitted\ @\ Ssc\ reference}$ $S_{SC\ reference}$ = 2 MVA single-phase
	Six-pulse three-phase converter	Active-front-end three-phase converter	Twelve-pulse three-phase converter	Single-phase rectifier
LV	22 kVA	192 kVA	77 kVA	7.9 kVA

NOTE: An explanation of the converter technologies is provided in Annex B.

NOTE: An active filter in combination with six-pulse three-phase converter equipment can be treated as equivalent to active-front-end three-phase converter equipment provided that the resulting harmonic current emission does not exceed the emission profile for active-front-end three-phase converter equipment given in Table B1. The emission from the six-pulse converter may increase due to the action of the active filter on voltage distortion and affect the overall emission of the combination of equipment; consequently this needs consideration in selection of the filter rating. To achieve the required emission profile it will be necessary for the active filter to be configured to target and adequately compensate each of the relevant harmonic orders where the emission from the six pulse converter would otherwise exceed that of Table B1.

Typical Low Voltage Fault Level ratings at Standard Three Phase Distribution Substations.

Transformer Rating	1000	800	750	500	315	200	100	50
Typical Fault Level (MVA)	17.97	14.43	13.43	8.97	5.63	3.67	1.80	0.95

Typical Calculation Results Table

The table below has been produced to show the results of the low voltage calculation when considering typical three phase distribution substations against the maximum aggregate equipment rating of each technology type:

		PCC LV Board							
	Transformer Rating	1000	800	750	500	315	200	100	50
Technology Type - Typical Permitted Aggregate equipment rated power (kVA) @ PCC @ LV	Six Pulse Three Phase Converter	39.53	31.74	29.54	19.73	12.38	8.08	3.95	2.09
	Twelve Pulse Three Phase Converter	138.37	111.10	103.37	69.05	43.34	28.28	13.83	7.31
	Active Front End Three Phase Converter	345.02	277.03	257.76	172.19	108.07	70.52	34.48	18.22

High Voltage Connections

Calculations:

Maximum permitted equipment rating at PCC =

$$= \frac{\text{Fault Level at PCC}}{\text{60MVA x Aggregate equipment rating of the technology type installed}}$$

The aggregate equipment rating of each technology type can be found in the extract of Engineering Recommendation G5/5 below:

Table 21 — Maximum permitted aggregate equipment rated power at reference short-circuit power (2A-1)

PCC voltage kV	$\sum S_{equ\ permitted\ @\ Ssc\ reference}$ $S_{SC\ reference}$ = 60 MVA three-phase		
	Six-pulse three-phase converter	Active-front-end three-phase converter	Twelve-pulse three-phase converter
6.6, 11, 20, 22	76 kVA	673 kVA	287 kVA

NOTE: The values stated assume a three-phase short-circuit power at the PCC ($S_{SC\ PCC}$) of 60 MVA.

NOTE: An active filter in combination with six-pulse three-phase converter equipment can be treated as equivalent to active-front-end three-phase converter equipment provided that the resulting harmonic current emission does not exceed the emission profile for active-front-end three-phase converter equipment given in Table B1. The emission from the six-pulse converter may increase due to the action of the active filter on voltage distortion and affect the overall emission of the combination of equipment; consequently this needs consideration in selection of the filter rating. To achieve the required emission profile it will be necessary for the active filter to be configured to target and adequately compensate each of the relevant harmonic orders where the emission from the six pulse converter would otherwise exceed that of Table B1.

Primary substation fault levels can be found using Northern Powergrid Heat Maps, and by following this link

Demand Availability Map | Northern Powergrid

Calculation Table:

The table below has been produced to show the results of the calculation when considering typical three phase high voltage fault levels against the maximum aggregate equipment rating of each technology type:

	Typical Fault Level (MVA)	300	250	200	150	100	50
Technology Type - Typical Permitted Aggregate equipment rated power (kVA) @ PCC @ 6.6,11,20 and 22kV	Six Pulse Three Phase Converter	380.00	316.67	253.30	190.00	126.67	63.33
	Twelve Pulse Three Phase Converter	1435.00	1195.83	956.67	717.50	478.33	239.17
	Active Front End Three Phase Converter	3365.00	2804.17	2243.33	1682.50	1121.67	560.83

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Accreditation

Certification for work on streetlight fusing

As detailed in the ENA Engineering Recommendation G39, operation of the Northern Powergrid service cut-out fuse supplying unmetered street furniture shall only be permitted by trained and competent personnel who are authorised in writing to perform such operations. An authorisation certificate to work on street furniture may require attendance of the operative at a Northern Powergrid training centre.

In accordance with the Competitions Code of Practice (Part C – section 5.2.2), Northern Powergrid will accept evidence of operatives having been authorised for G39 duties by other DNOs as proof of competency in order to issue them with a Northern Powergrid authorisation certificate.

There can be an agreement between Northern Powergrid and a local authority to authorise their own personnel to carry out these duties.

For street light charging, the maximum fuse size is 20A, which can provide a supply of 25A.

Any contractors upgrading fuses will need to be certified to work on our network and are not permitted to operate on our network equipment without certification.

For a contractor to self-nominate, Northern Powergrid require:

- All operatives' names and their employer
- A copy of the operatives' G39 certificates
- An in-date First Aid certificate for the operatives
- A Letter of Authorisation endorsed by the relevant Local Authority that states the contractor is taking responsibility for the operatives under their own authorisation process
- Confirmation the operatives have completed the Northern Powergrid induction and have received a copy of our safety rules

Once the above has been completed, the contractor can then issue their own authorisation certificate (template available to request).

For Northern Powergrid to authorise a contractor's operatives, we require:

- A nomination form from the contractor clearly stating what you want your operative to be assessed against (what authorisation they need). This needs to be signed by a nominating manager and by the Local Authority stating that the operative needs G39 authorisation to carry out the work for them. This is not stating the Local Authority are taking responsibility, it is just to confirm that person needs the authorisation to work on the low voltage system.
- A valid First Aid certificate
- A valid manual handling certificate
- A CV showing training history
- Any previous or current authorisation certifications with any other network operators

Once the above has been provided, we will generate a unique ID and a date for the operatives to attend an assessment at a Northern Powergrid training centre. Should the operative pass the assessment, they will be provided with a Northern Powergrid authorisation certificate and books.

Refer to our Code of Practice for Work on Street Lighting and Street Furniture for more information.

OLEZ authorisation

Though being on the authorised register is not required to connect EV charge points to our network, we recommend that our customers use an authorised installer on the OZEV register. Installers who are not currently on the authorised register, can apply on the OZEV website.

Applying for a new separate connection at sites with existing supplies

Installing in car parks

Fast charge points installed off-street in public locations, such as car parks, will have different requirements to installing on the public highway.

Where there is an existing supply, a new separate supply will only be offered if all of the conditions laid out in our briefing, 'Applications for Electric Vehicle charging installations at sites with existing supplies" are met. These are:

- The EV charger(s) will be owned and operated by a third party. To clarify, this must be a different company than the one that owns and operates the existing electricity supply;
- The land where the EV charger(s) will be installed is owned or leased by that third party; and
- At least one boundary of the land where the EV charger(s) will be installed is touching the boundary of the overall site and is away from the main building of the site with which the EV chargers might be associated.

It is not possible for Northern Powergrid to provide a separate electricity supply for underground, multi-storey or internal car parks. Any new supply will be provided at ground floor level.

Installing at petrol stations

The APEA (petrochemical industry best practice association) guidance document states all supplies to a petrol filling station must be connected to a common TT earthing system, and all supplies must be controlled by the forecourt emergency switching system.

The petrol filling station will be classified as one site unless there is 10m or more segregation between the fuel filling station earthing system or electrical system, and the vehicle charging earthing system or electrical system. This is the case regardless of the lease/ownership of the parcels of land within the petrol filling station curtilage.
Should we receive a request to provide an additional separate supply to a petrol filling station, one of the following connection arrangements will be used to provide the capacity for the EV chargers:

- Upgrade the existing supply to cater for the capacity of the filling station, and the EV charging installation.
- Move the existing filling station supply on to a new proposed IDNO network. The IDNO would then determine how they would like to arrange their network (as they would be the sole DNO on the site, and responsible for how they run their network).
- Provide a communal metering location, for both the filling station and the EV chargers to provide two metering points. In this option both supplies would either need to be supplied by Northern Powergrid, or the proposed IDNO.

Glossary

Adopted highway: A public highway that is maintained at public expense by a local authority.

Cut-out (fuse): The safety device positioned between our network and the meter which manages the maximum load served to that connection.

DFES: Distribution Future Energy Scenarios – forecasting of our region's future energy pathways, used to inform our network development decisions.

EV: Plug-in electric vehicle, conventionally powered by a lithium-ion battery.

EHV: Extra high voltage – electricity supplies above 22kV.

HV: High voltage – electricity supplies between 1kV and 22kV.

ICP: Independent Connection Provider, a third-party company that is permitted to deliver certain connections services for customers, providing competition in connections services.

kW: Kilowatt – one thousand watts of electrical power.

LAEP: Local Area Energy Plan – a model of local net zero planning being undertaken by some local authorities, translating national net zero targets into plans for local action.

LCT: Low carbon technology – technologies that have the ability to reduce carbon dioxide emissions traditionally associated with energy consumption (e.g., electric vehicles, electric heat pumps, solar panels).

Looped service: An arrangement where multiple properties share a single point of connection to the electricity network. Often requires replacing with a direct connection where households are seeking to install LCTs.

LV: Low voltage – electricity supplies less than 1,000 volts.

MW: Megawatt – one thousand kilowatts of electrical power.

Net zero: Legally binding greenhouse gas emissions target which requires UK to reduce nearly all of its emissions by 2050 (compared to 1990 levels).

O-PEN: A type of protection equipment used for some EV charge point installations.

Single phase supply: An electricity supply connected to the low voltage network with a single fuse.

Time-of-use-tariff: A type of energy tariff with variable prices which rise and fall with the supply and demand of energy markets e.g. offering cheap electricity during times of high renewable generation, or periods of low demand such as between midnight and 6am.

Three-phase supply: An electricity supply connected to the low voltage network with three separate fuses.

Unadopted highway: A public highway that is not maintained at public expense by a local authority.

V2G: A smart charging arrangement where an EV can discharge its stored energy back to the local grid.

V2H: A smart charging arrangement where an EV can discharge its stored energy directly to a home or business at specific times, such as at times of high demand.

Wayleaves: A legal arrangement that grants a party permission the right to access the land of a third party.

General enquiries

— For more information and support for your electric vehicle visit our website: www.northernpowergrid.com/electric-vehicles

Ask an expert

— For organisations installing chargepoints at multiple locations, access direct support by emailing our Regional Insights team: LAEP@northernpowergrid.com

Speak to the Connnections team

— Find our latest surgery dates on our website: northernpowergrid.com/customer-events-and-surgeries

— To speak to a member of our team, you can call: 0800 011 3433