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2021 Guide on Heat Pumps and DNO Engagement with Local Authorities or Building Owners

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Who is this guide for?

This guide is intended for local authorities or building owners who are considering installing Heat Pump(s) to replace existing fossil fuel, carbon emitting heating systems.

Which constitute **37% of the total CO_2 emissions** caused by heating of buildings in the UK. The conversion will be supporting the de-carbonisation of heating by moving to a net zero lifestyle by 2050.

What is this guide about?

Tackling emissions from heating is vital. Information from BEIS puts the total emissions from heating buildings in the UK at 37% which accounts for the largest proportion of the UKs Greenhouse Gas emissions.

In June 2019, the UK became the first major economy to pass secondary legislation to end its contribution to global warming by 2050. This will require the UK to bring all greenhouse emissions to net-zero by 2050. In order to meet this target, it is vital that the emissions and the energy required for space heating (SH) and domestic hot-water (DHW) are cut to a minimum and only net-zero-carbon sources are used.

About 90% of UK homes use gas boilers, which for a long time have been accepted as a comparatively efficient and convenient heating source. But each time you turn on the heating system or turn up the thermostat, the burning of natural gas, oil, LPG or solid fuel generates heat through the radiators and puts carbon dioxide into the atmosphere.

The available heating options and generation of electricity has changed immensely, with major technological developments and alternative sources of energy emerging over the last 10 years. The current choice of net zero building heating are district heating networks working with Combined Heat and Power (CHP), using either ground source or air source Heat Pumps or ”greening” the gas grid by blending in “green” or “blue” hydrogen (H) with the natural gas.

Heat Pumps use electricity to generate heat, they can be carbon free if the energy has been provided by renewable or carbon free sources.

When either air source or ground source heat pumps are used for heating buildings, both types essentially transfer heat from one place to another by using a liquid refrigerant and a compressor in a process powered by electricity.

Heat pumps are classified by where they source their heat from (ground, air or water) and whether they distribute heat using warm air or hot water which moves through pipes to radiators or underfloor heating (hydronic).

Air source heat pumps (ASHPs) extract heat from the air, ground source heat pumps (GSHPs) extract heat from the ground, and water source heat pumps (WSHPs) extract heat from water.

The combination of the source and heat distribution then form the description for the heat pump system, which includes air-to-air (ATA), air-to-water (ATW), ground-to-water (GTW), ground-to-air (GTA), water-to-water (WTW), and water-to-air (WTA).

All of these heat pump systems can provide both heating and cooling, however for hydronic systems fan assisted radiators are required.

There are two types of ATW heat pumps:

Monobloc systems

All components are contained in a single outdoor unit, in which heat is transferred to the circulating water. Installation is simple and does not require the handling of refrigerants outside of the factory.

The monobloc ASHP is functionally very similar to an air conditioning unit as it operates the same refrigeration cycle in reverse; the chassis, the evaporator, compressor, and printed circuit boards are all similar.

Split systems

These have both outdoor and indoor units. A refrigerant is used to transfer heat between these units, meaning installers must be F-gas qualified to install pipework containing refrigerant — not all installers have this qualification.

Because of this extra plumbing, split systems can be installed further from the building, giving more flexibility and opportunity to reduce sight and noise pollution.

Locating your Site

A very simple way to find out who your Local Distribution Network Operator is by going to:

www.energynetworks.org/operating-the-networks/whos-my-network-operator

Type in your post code and click Go. This will then provide you with who your electricity Distribution Network Operator is, and who your gas network operator is.

What is a Distribution Network Operator?

A Distribution Network Operator (DNO) is a company licensed to distribute electricity in the UK.

It is responsible for the distribution of electricity downstream from the national transmission grid, to industrial, commercial and domestic users.

It also maintains and operates the underground cables, overhead lines and substations. When new charge points are installed, it is the DNO that connects them to the local power network. DNOs do not supply the electricity. Electricity suppliers pay DNOs to distribute electricity through the network to homes and businesses.

Customers can choose from many different electricity suppliers.

Before installing the heat pump there is a need to download the common EV and HP application form from the Electricity Networks Association, the trade body for the DNOs, please go to:

https://energynetworks.org/electricity/futures/electric-vehicles-and-heat-pumps.html

At this site there is detailed information as to how to assess the load of the business and other valuable information, it would be advantageous to read the available information.

Once the EV and HP connection form has been downloaded and completed it then needs to be sent to the local DNO.

If your local DNO is Western Power Distribution, you can forward your duly completed form to the following email address:

wpdnewsupplies@westernpower.co.uk

How can DNOs help?

The cables, overhead lines and substations that make up an electricity network are assets with a typical fifty year life. Networks installed today are the result of many years of planning and development.

Additional connections to the distribution network will need to be assessed to determine if there is available capacity or if local upgrades will be necessary.

An early engagement with the DNO and a qualified electrical contractor can help identify whether the proposed location has adequate capacity to meet the demand, the DNO can also help identify alternate locations with spare capacity, which could reduce the cost.

If there is enough capacity from the existing supply, no network reinforcement will be required. If any reinforcement is needed, it will be the local DNO who will provide this.

The DNO will also provide quotations for new connections and upgrades to existing ones. The scope of the upgrade and reinforcement could extend to include increases in capacity for existing transformers, distribution overhead lines and cables to meet the new higher peak demand and lower impedance connections. Cost calculations for grid network investments will vary depending on the local situation but a guide is provided here.

When thinking about planning to get heat pumps installed and operational, it is important to think of the process from the energy system perspective – with the DNO providing the critical link to an electrical power supply.

Put simply, any plan to install heat pump infrastructure needs to consider both the hardware installation and necessary grid network reinforcement.

The UK government is targeting 600,000 heat pump installation per year by 2028.

Considerations for buildings

With heat pumps becoming more mainstream, and increasingly the norm for new-build homes system choices and designs will increase.

The UK government is targeting 600,000 heat pump installation per year by 2028. Heat pumps are a key part of the “10 point plan for a Green Industrial Revolution” and are referenced in the 2020 Energy White Paper.

Data produced by BEIS in November 2020 states that current heat pump installation rates in the UK are circa 34,896 per year, these installations are almost split evenly between retro fits and new build properties. It is expected that new buildings should be very well insulated.

When new houses are built, decisions around their construction stay with the country for decades.

If new houses are built to high insulation standards they can viably be heated using green electricity with very little strain on the grid, using direct acting heating systems with no real need for the use of expensive heat pumps or heat storage systems.

Some recent studies suggest that housing can be built to a super-energy-efficient Passivhaus standards for only a 5-10% uplift in procurement costs.

This typically reduces heating demand by more than 75% compared to current building regulations. A more challenging situation is the conversion of older properties, which are typically poorly insulated.

According to the Centre for Ageing Better, 21% of all homes in the UK were built before 1919, 38% were built before 1946, and only 7% after 2000, making the UK housing stock the oldest in the EU[1].

UK building stock needs to be made more suitable for heat pumps and their flexible operation. The buildings need to be brought up to the current level of insulation standards.

Once insulation is improved, heat pumps can work very effectively in these properties, and with the greener grid this is a sensible solution to reduce carbon emissions.

Typical emissions associated with heat pumps could mean a drop of more than 60% in emissions when compared to storage heaters or oil fired boilers.

[1] Page 1 More than 1m over 55s living in hazardous homes Home Care Insight study finds. Access/Intelligence/Studies by Sarah Clarke 09/05/2019 https://www.homecareinsight.co.uk/more-than-1-million-over-55s-living-in-hazardous-homes-study-finds/

Retro fitting of heat pumps

Looking at retro-fitting heat pumps into old poorly-insulated buildings, the main challenge is how to ensure the low grade heated water temperature from a heat pump can provide sufficient heat.

To offset the lower water temperature larger radiators are often required. If a boost of heat is required this is often provided by an immersion heater installed in the system which can impact on running costs.

Delving deeper it is about the level of heat required and at what times, and this is all tied up to the type of building and its use. For example, does the building have a lot of internal mass, stone or brick walls because of their inertia, will be slow to heat, and thereafter slow to cool down. Or is the internal fabric of the building more lightweight and predominately insulated, this will mean quick to heat up and quick to cool down.

There is also a need to consider the occupancy of the building, is it occupied all the time, or empty during part of the day? Another point to consider will the building be utilising time of use tariffs and possible future 'smart/flexible network'?

Heat pumps in old buildings can provide a fit-and-forget technology, but they need more user-engagement and a mind-set change of the user. A customer might expect a heat boost approach over a short heating period similar to the fossil fuel systems they are used to. Heat Pumps provide a more consistent background level of heat.

Retaining that heat, especially when compared to a new build well insulated building, is a key feature if the best results are to be achieved. Heat pumps are very efficient at producing low grade heated water at about 30 to 40°C.

However, if there is a requirement to run the water hotter, then the electrical power-input requirements rise, the energy efficiency drops and hence the running cost rise. To ensure the efficiency of the system is maintained and keep running costs in check requires the use of very large-area radiators or a well-designed underfloor heating system, which is usually difficult in old un-insulated buildings.

Fossil fuel heating has generally been designed with high-output, for short periods. This means people are used to 'turning the heating on' and feeling warm relatively quickly. Because, heat pumps are more efficient operating at the lower water temperatures, heat pump systems will require a mind-set change by the user. The new heat pump user will require some patience, and also some knowledge that the heating system is running with low water temperatures, and hence the system will respond very slowly, therefore there is a need to plan ahead and let the building warm up gently.

Using a heat pump in a timed manner will result in a lower COP

Retro fitting of heat pumps

Heat pumps in old high internal mass buildings are now erring towards a more continuously-enabled system, and contrary to instincts, a heat pump system operated like this can use less energy than one operated on an on/off time clock.

If the heating is required at a constant temperature, e.g. a care home, then the radiators may be able to operate 'warm' all the time, resulting in very high energy-efficiency, high COP.

Bearing in mind heat pumps provide low grade heating, keeping an old brick building warm while un-occupied is invariably seen as uneconomical, especially with the fossil fuel heating systems. Counter intuitively, heat is stored in the building's fabric, so heating while you are out at work is not as wasteful as one first thinks.

Conversely, if the buildings heating is operated with a timer as with a typical fossil fuel system, the building does cool down, during the various off portions of the day or night, then there will be a need to operate the heating system at an elevated temperature so as to bring the building back to a comfortable temperature. Using a heat pump in a timed manner will result in a lower COP, thus getting less heat for the money whilst operating on the timer. As stated before, the thermal mass of the building will have a big impact here.

If the building is an old stone or brick building, the reduced temperature set for the night or un-occupied period, then the radiators will need to be warmer to overcome the inertia of the cold walls and provide a comfortable temperature.

Taking advantage of the high COP by running the heat pump constantly this will result in the constantly-enabled lukewarm radiators overcoming the inertia of the cold walls and maintaining a comfortable temperature.

Conversely, if the building has a lot of internal insulation, with few stone or brick inner walls, the thermally inertia will not be present.

Therefore the re-heat of the building to a comfortable temperature should not take a long time, so running a timed heating system is likely to have benefits to the building owner.

Considerations for converting an existing heating system

Basically there are two types of heat pumps for heating. One extracts heat from the air, known as an air source heat pump.

These are the most commonly installed varieties especially on retrofit locations and resemble an air conditioning unit on the outside of the building.

The second type are ground source heat pumps that extract heat from the ground, the ground source heat pumps require either a horizontal or vertical ground loop or array being installed at the property, this requires some fairly major civil work.

Both types essentially transfer heat from one place to another by using a water and liquid refrigerant and an electrical compressor.

Things to consider before investing in an air source heat pump:

Placement of the air source heat pump

An air source heat pump requires plenty of space, either to mount on an external wall or to be placed on the ground.

The unit needs good air flow, and foreign objects such as boxes, containers etc. need to be kept well away.

Insulation

Unlike gas central heating, heat pumps provide low grade heat on a consistent basis. To maximise effectiveness, ensure that the home is suitably energy efficient by installing wall insulation either cavity or solid wall and draught proofing. These are low cost measures that will make a big difference to the utility bills, therefore it is worth investing in them prior to replacing the heating system with an air source heat pump.

Efficiency of air source heat pumps

Despite air source heat pumps being able to operate at -15°C, the efficiency decreases as the outside temperature drops; therefore in a particularly cold location, the heat pump may well need to activate the supplementary heating element to obtain the required heat output.

Noise of air source heat pump

An air source heat pump does make some noise when operating, as both a fan and a compressor will be in motion.

The noise is, depending on the system, approximately 40-60 decibels from a distance of one metre away.

Therefore it is sensible to ensure the air source heat pump, it is not placed where it will be a nuisance to all parties.

One method that can help by avoiding the high running costs and delivering heat without creating capacity peaks on the electricity system is the hybrid heating and control technologies, where an air source heat pump is added into the existing heating system, these hybrid systems can deliver low carbon heating solutions in homes that reduce CO_2 emissions but keep the costs down for the customer.

There is one important point that needs to be born in mind, any home that has been plumbed with microbore tubing needs special consideration.

Microbore usually comes in 10mm and 8mm outside diameter. The issue with microbore pipework is the water volumes and the additional pressure drop of the system.

This is definitely not ideal for a heat pump but can be overcome with a buffer vessel between the heat pump and the radiator system, the buffer tank would then introduce system separation and the circulation pump can be sized to overcome the resistance.

How do Heat Pumps work?

An important consideration for heat pumps, is heat pumps do not heat up water to the same extent as gas or oil fired boilers within a wet central heating system, there are some important things to research before a heat pump is installed.

For every

1kW of electricity,

some heat pumps have the potential to produce 4 or 5 units of heat respectively.

The first is radiator size. If one is replacing an existing wet central heating system with a heat pump, the current radiators may not be of an adequate size for the rooms. Secondly, as the heat is not of the same temperature as gas, oil and biomass boilers it is essential to have a well-insulated house to ensure that the required temperature is reached.

A heat pump does not create heat. It simply moves it from one place to another through the vapour compression cycle or in other words the refrigeration process to make it more useable. Heat from the air or the ground gets absorbed into a fluid, which is then compressed, raising its temperature. The higher temperature is then transferred into the heating system. Electricity is needed to power the pump.

The efficiency, or the measure of the heat energy output per kW of electricity, is stated as the Coefficient of Performance (CoP). With air source heat pumps the CoP varies throughout the year, with lower figures achieved during the colder months meaning they are running less efficiently, since there is less ambient heat available to remove from the air.

This makes comparing the efficiency of different heat pump systems very difficult, therefore what is known as the Seasonal Performance Factor is used to compare like for like performance of models. This is the annualised CoP, taking into account the different performance throughout the year.

For example, using this scale an air source heat pump efficiency as high as 4, whereas a ground source heat pump could reach 5.

This means for every 1kW of electricity, some heat pumps have the potential to produce 4 or 5 units of heat respectively.

Air source heat pumps don't produce boiling water, the air source heat pump does not produce the sort of hot water temperature one would associate with a gas, LPG or oil-powered boilers. With a boiler, one would expect the hot water to be heated to about 85°C, while some heat pumps can produce water to about 55°C.

Trying to increase the water temperature from a heat pump beyond this requires the compressor to work harder, meaning more electricity – this in turn reduces its efficiency or coefficient of performance.

As a result, it is very important to minimise heat loss from the property prior to installing a heat pump. This includes insulating the walls, loft and ideally the floor too.

This means that even though the radiators won't get as hot when using heat pumps, the house is still heated effectively and ones not straining the heat pump – which is expensive.

Air Source Heat Pumps

The air source heat pump gets its energy from the surrounding air, so as the air temperature drops, so does the efficiency.

The bigger the difference between the outside air and the target temperature (either the indoor room temperature or domestic hot water), the lower the efficiency. It is therefore key to understand the heat load of the property and the performance characteristics of the heat pump. For space heating, air source heat pumps work best with underfloor heating, but low-flow temperature radiators will work as well.

One of the first decisions to make when buying or specifying an air source heat pump is whether it will provide 1) space heating (SH) or 2) domestic hot water (DHW) — or both.

The key here is that the 'flow temperature' the temperature of the water in the heating system) is different: -

- SH will usually require a flow temperature of around 35°C to 45°C for underfloor heating or low-temperature radiators. While;
- DHW will, however, require a minimum flow temperature of 55°C.

With new homes that meet or exceed the recent and current Building Regulations most air source heat pumps can do both, but this is not always the case.

One way of meeting the above temperature difference between SH and DHW is to use two heat pumps, one that is optimised for the space heating and the other for domestic hot water.

The advantages of using the two heat pumps is that each unit is optimised for the required flow temperature and there is no priority system that causes the space heating circuit to 'cool' while the domestic hot water is being reheated.

The domestic hot water heat pump typically uses a different refrigerant that can produce higher flow temperatures but also requires a higher source temperature (above 4°C) to be efficient.

It tends to be lot smaller than a space heating heat pump and can be built into the hot water cylinder. It draws its air either from the room it is in or from the exhaust waste heat of a ducted mechanical ventilation system —and is known as an 'exhaust heat pump' or a 'micro heat pump'.

The dual heat pump system has been taken a set further by some manufacturers, what they are doing is using the dual heat pump to produce higher temperature heat pumps. In order to achieve the higher temperatures, these manufacturers have built the two different refrigerant systems into one heat pump in a 'cascade' system that can create flow temperatures of up to 80°C. Such systems, such as the Daikin Altherma are designed for hot water and should not be used as a high temperature boiler replacement unless the lower efficiency has been carefully calculated to ensure that it is the best option for the property.

There are also other new technological advances that are worth noting such as compressors that allow the compressed vapour to be re-injected into the compressor.

For space heating, air source heat pumps work best with underfloor heating

Ground Source Heat Pumps

Ground source heat pumps use the earth as a heat source, taking advantage of the stable temperatures in the ground to provide heat and hot water for the home.

Ground source heat pumps are not a new concept and have been around since the 19th century. This technology became very popular in Sweden in the 1970s and since then units have been sold worldwide.

A ground source heat pump system uses heat trapped beneath the ground and boosts it to a higher temperature using a heat pump. This heat is then used to provide home heating or hot water. The heat pump performs the same role as a boiler does in a central heating system, but uses ambient heat from the ground rather than burning fuel to generate heat.

Initially, a heat transfer liquid normally glycol is pumped through pipes buried deep in the ground. As the liquid travels through the pipework it absorbs ambient heat from the ground and warms up, before returning back to the ground source heat pump unit. Once it returns, a heat exchanger removes the heat from the liquid and it then continues to travel round and round the pipework in a continuous cycle.

The low-grade heat is transferred through the heat exchanger, then passes through a heat pump compressor which drives the temperature up to a level that is usable for heating and hot water.

A ground source heat pump system uses heat trapped beneath the ground and boosts it to a higher temperature using a heat pump

Frequently asked questions

How much pipework does a ground source heat pump require?

The length of the ground loop or array depends on the size of the home and the amount of heat that is required – longer loops can draw more heat from the ground, but need more space to be buried in.

The pipework can either be laid horizontally or vertically. If laid horizontally, the pipework tends to be buried in trenches 2-3m deep, spread over a huge surface area to ensure the heat transfer liquid has the opportunity to increase to a sufficient temperature.

If the pipework is installed vertically, boreholes get drilled in to ground typically at a cost of £6,000 – £8,000 for each borehole.

The boreholes need to be drilled by professionals and will regularly exceed 100m in depth to ensure that the heat transfer liquid again has the opportunity to absorb enough heat.

Do I need planning permission for a heat pump?

This depends on where you live in the UK. Usually, unless you live in a listed property or conservation area, ground source heat pumps are considered a permitted development.

One shouldn't need an application for planning permission, but it is still worth checking with your local authority before starting installation, however. With air source heat pumps, in England and Scotland you can install an air source heat pump as it forms part of permitted development. However in each region, the home owner needs to follow specific guidelines and not contravene them in order to proceed with the installation.

If you live in Wales and Northern Ireland, speak to the relevant local authority to get a planning application submitted and approved before proceeding with the installation.

Since the end of 2011, if you live in England, all heat pumps (air and ground) are considered a permitted development, so no planning permission is required. Further details can be sought from the relevant planning authority.

You also need to make sure that the developer that is installing the air source heat pump speaks to the local authority and gets clearance for the size and type of unit being installed. Not all systems may necessarily comply with permitted development criteria.

Installing a ground source heat pump

The Energy Saving Trust (EST) recommends households considering a ground source heat pump to consult a Microgeneration Certification Scheme installer and only use a properly accredited professional to complete the work.

During its trial, the EST found a variety of heat pumps incorrectly installed, which therefore didn't perform as efficiently overall as they could have.

Ground source heat pumps are not a new concept and have been around since the

19th century

Power requirements and supply capacities

Larger business and commercial customers, usually above 50kVA demands, have a supply capacity which is agreed with the DNO.

The business may also pay availability charges based on this capacity. It might be that, due to changes in business processes or general energy efficiency, this supply capacity is greater than the business current usage.

In the first instance it would pay the business to look back at their last 18 to 24 months of electricity bills to get a better understanding on what their consumption figures are in relation to their agreed capacity. Capacity may already exist for heat pumps.

For example they have a 250kVA connection and are only using 175kVA, there is a spare 75kVA which could be used to supply the heat pumps, it would be expedient in the first place to utilise this spare capacity instead of paying for a bigger connection.

The capacity may also allow a business to create a plan, with a smaller provision of charge points in the early days and a larger provision, with a supply upgrade, at some time in the future when more BEVs are operating for them.

A key consideration is to examine the energy efficiency of the buildings under consideration and update the energy efficiency first before addressing the actual heating method otherwise the low carbon heating system installed would be over sized to compensate for the buildings heat losses.

Understanding the way in which you already use electricity

Once you have worked out your requirements there is a need to understand when your company or business will be actually running the heat pumps during each 24 hour period of the days.

A couple of points to consider:

1. What hours does your LA Depot/business/ persons work or the buildings will be vacant?
2. What is the EPC rating of your buildings?
3. Will you require space heating and hot water?
4. Do the buildings have any form of PV or battery storage fitted?
5. What is the typical internal construction of the building, i.e. will there be inertia in heating due to stone or brick walls?

Once you have answered these questions you will have a better understanding of what capacity for the heat pumps you will require and at what time of day you will require it.

With this information your assigned supply capacity for your site and with the knowledge you have about the amount of electricity you use during the different parts of the 24 hour day this will allow you to look at various options like:

Optimising your existing power supply

If you can modify how you already use power at your site, you may be able to free up capacity at certain times of the day. For example, if you have a building onsite that you are able to reduce the amount of power used for machinery, heating or lighting, you could save a significant amount, rather than paying for more capacity on the network.

On-site generation and battery storage

If you are able to store electricity through another source i.e. a stationary battery, you could then use this stored power to run your heat pumps, meaning you would not need to take power from the network. If you already have or could install on-site generation i.e. solar panels, you could then produce your own electricity, charge your stationary battery, and heat your building.

Timed profile connection

This is an agreement you have with your network operator that you are only able to heat at certain times of the day. By sticking to the pre-agreed schedule, you can save costs by not having to upgrade your connection. This works particularly well if you only need to heat your building at night, as there is less strain on the network.

Flexibility

Integrated with time-of-use tariffs and heat optimization software. Smart controls will optimize heat production and automatically “load-shift” for grid stabilization, cost and carbon savings. This can help the grid cope better with increased demand from new technologies and in turn help you heat at a lower cost.

Load management

Load management controls the power that supplies your heat pumps to ensure you do not go over your overall supply limit.

This means you can still use the heat pump, but at a reduced level.

Getting power to your site

If you are unable to choose one of the above methods to “control” your load then, you will need to speak to your network operator like your host DNO to provide more power to your site before your charge point is installed.

Your DNO will be happy to discuss your power requirements prior to you making an application. Once submitted your DNO project designer will produce an electrical design which will tell you how they will get power directly your site.

They will send you a quotation for the work that the DNO needs to do. Once you have reviewed, accepted, and paid for your quotation, your DNO will discuss what they need to do to get the right size cables from their network to your site and provide you with a date to carry out the necessary work. In urban areas the means of supply is normally via underground cable, depending on what voltage level your company/business is supplied at i.e. 11kV or LV will dictate the type of underground cable connection.

Typically the cable are run in the sidewalk and fall under the New Roads and Streetwork Act when digging in the road or sidewalk the host DNO needs to provide 12 weeks’ notice to the Local Council before work can take place.

In some cases the supply is via overhead line if this needs modifying the process is more involved and requires wayleaves, Section 37 Approval and Planning Approval this can be a long defined process.

If underground cables or overhead line cross third party land there is a need to obtain wayleaves this is normally an easement for the circuit which costs money, the amount of money is variable and dependant on the land owner.

If a new distribution substation is required typically a 4m by 4m site is required for a ground mounted substation which would supply the electricity to you company/business, one needs to remember electricity assets have a life of 50 years. The substation site will require a defined concrete slab onto which a unit substation would be placed complete with GRP enclosure.

The Cable route

Your DNO will quote for all works from our electricity network to your meter cabinet. This will be split into two parts; the “non-contestable works” being the final connection at the substation and the “contestable works” being the cabling to you meter cabinet. Your work will include the meter cabinet and all cabling to the EV charger(s) within your site.

Substation design

If you are installing lots of chargers you might need to put a substation on your land. The substation transforms the power down to a level that you can use on your site. We need space to put this substation and you may be required to arrange things like a substation foundation to allow your DNO to complete the connection. Your local DNO will help you understand the process but it is important that you have a competent electrical and civil contractor to assist you.

Crossing third party land

If the cable we need to use to give you power passes through or over 3rd party land before it connects in your meter cabinet within your boundary, your DNO will need to obtain consent from the relevant authority.

Your onsite works

There will be some work that will need to be carried out on site to allow your DNO to complete your network connections as smoothly and quickly as possible.

This includes:

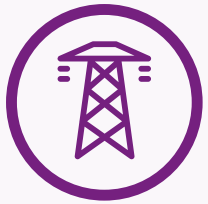
- Excavate cable trenches
- Multi-utility arrangements
- Joint bays
- Ducting of cable services
- Trench back filling and reinstatement.

Who is involved in the electricity connection process?

Electricity connections require a number of different services.

The DNO, the electricity supplier, heat pump installer and an electrical contractor need to be contacted and involved.

Heat Pump Installation



DNO

Provision of required network capacity and electrical infrastructure

Electricity Supplier

Installation of meter to the property

Suitably Qualified Contractor

Heat pump installation

When? Who? Why?

The following steps should be followed when considering the installation of any heat pump(s):

1

- Identify some possible properties and locations
- Decide on the number and type of heat pump(s)
- Make initial contact with your DNO to submit an enquiry and discuss network capacity at the locations concerned or request guidance for alternative locations
- Appoint an electrical contractor for the heat pump installation

2

- Download the ENA EV and HP Application form from the Electrical Network Association website, you will need your MPAN number which you can obtain from your electricity bill
- Submit a map where the preferred location is marked with a circle rather than a specific point
- For multiple applications, prioritize the locations
- Provide your DNO with the technical data sheet for the heat pumps you are planning to install

3

- Receive, review and accept the DNO design and quotation received
- Appoint an electricity supplier who will bill for the electrical energy used
- Agree start and end dates for DNO works

4

- Energise your heat pumps(s)
- Operation and maintenance

Estimating connection cost and time

The new or retro fit of heat pumps to buildings can have an impact on the electricity network, this section provides illustrative costs and time for the power supply to be connected to heat pumps in different scenarios, whether it is removing a looped service cable or installing a new housing estate.

Heat Pump assume 6kW	Likely installation location	Typical approximate connection lead-times	Network and Third Party considerations	Approximate connection cost
House Looped service	Retro fit Domestic	Immediate in most cases	None, but looped service will be removed by WPD	None
House No other LCTs fitted	Retro fit Domestic	Immediate in most cases	Usually none	Usually none
House Other LCTs fitted	Retro fit Domestic	4 to 8 weeks	Likely upgrade to service cable and local mains	Often none but £1,000 to £3,000 in some cases
New House with LCTs	New Domestic	8 to 12 weeks	Streetworks and permissions	£2,000 to £12,000
New estate circa 120 houses complete with LCTs	New Domestic	16 weeks	Streetworks, permissions and cost of land for transformer	£70,000 to £120,000

Key points to consider

The cost and time for each heat pump project will always be location and application specific.

Each project will have a planning phase, procurement phase, along with an installation and commissioning phase. When planning a heat pump project, it is strongly advised that you contact your DNO early in the planning process.

As a simple rule of thumb, in your timing plan, allow as much time for information exchange and dialogue with your DNO during the planning phase as you allow for installation and commissioning.

It is essential that the heat pump that you wish to purchase is identified and considered prior to making your order. Some equipment has a high impact on the electricity network whereas other types can be accommodated more easily.

Pre-procurement market engagement with candidate heat pump providers will also help, as they have years of experience when it comes to installation and commissioning and will be able to offer helpful advice.

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