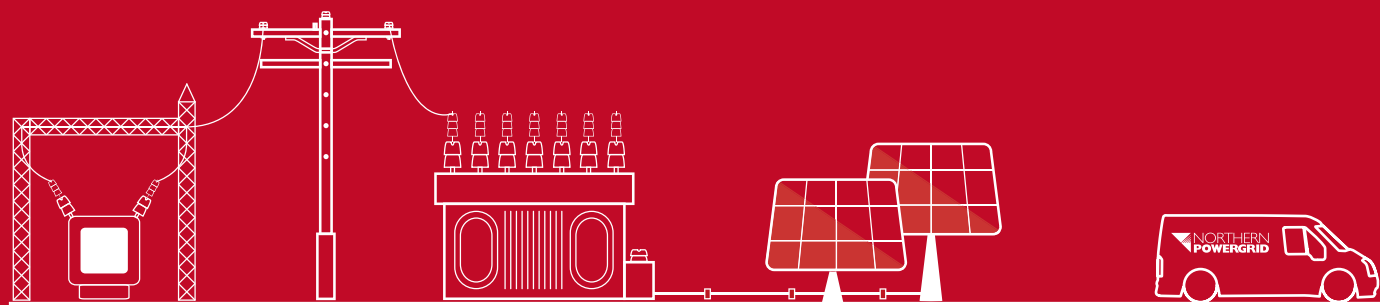


Connections Case Studies

HIGH VOLTAGE (HV) CONNECTIONS



Connections Case Studies

The connections projects described in this document are based on actual Northern Powergrid High Voltage (HV) connections delivered during 2015/16.

The following case studies can be used to help you:

- (a) plan your application to connect different types of HV connections projects to the Northern Powergrid network
- (b) estimate the likely costs and timescales to deliver those connections

These examples show the most common generation connection scenarios giving indicative costs.

More general connection examples and costs are also provided in our connections methodology and charges statements, these can be found online at:

- Yorkshire: www.northernpowergrid.com/asset/0/document/2926.pdf
- Northeast: www.northernpowergrid.com/asset/0/document/2925.pdf

This document should be read in conjunction with these statements.



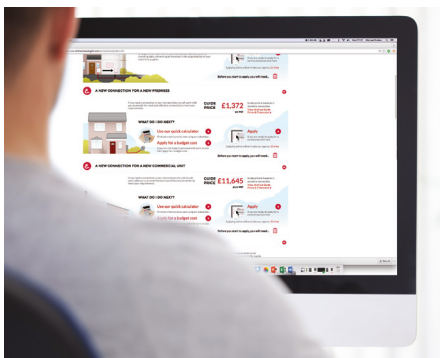
A large warehouse requiring a new 3MVA connection



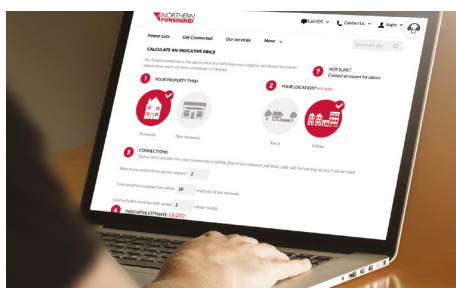
A customer applied requesting a new connection for a large warehouse that was under construction within the Northern Powergrid area.

The total capacity required was 3MVA. The customer asked for a full connection offer, as they wanted Northern Powergrid to complete all the connection work.

The customer had used our online tools to assist them before submitting their request for the connection. They used our [demand heat map](#)¹ to determine that the area of land they were considering buying had a low number of network constraints and our quick calculator tool to create their own budget estimate.



The customer submitted his application online at https://myservices.northernpowergrid.com/connections/index.cfm?som_event=general.index&som_path=/connections/index.cfm



QUICK CALCULATOR

You can calculate an indicative cost for a simple connections project using our online quick calculator tool. It shows you a typical cost for a new connection based on similar work we have done in the past.

www.northernpowergrid.com/quick-calculator

The customer submitted their application online. The online application tool walked them through the process and ensured they provided us with the following important information:

- contact details – name, postal or email address, and telephone number
- full site address and postcode
- a site location plan, indicating site boundary and ownership details
- the location of the proposed meter point
- load details including information on a 200kW compressor indicating the starting conditions

Assessing the application

The customer's application was given a unique reference number and allocated to an engineer for assessment. The guaranteed standard applied was ECGS3B, which means we will provide the customer with a connection offer within 35 working days of us receiving all the information we need to make an offer.

We have published guides and information on our website to help customers understand our [guaranteed standards of performance](#)².

Our engineer contacted the customer to discuss their final connection requirements, including the location of the new substation and to confirm that they would require a secure connection, which we would provide by installing two 11kV feeders as a looped connection.

The engineer's assessment included;

- checking the surrounding HV network to determine if there is sufficient capacity available to allow the connection to be made
- technical calculations to ensure that the operation of the compressor would not affect supplies to existing customers and;
- earthing studies undertaken to ensure the rise of earth potential at the substation would remain within safe limits in the event of a fault.

The assessment confirmed that the existing High Voltage (HV) network could accommodate the new connection and the engineer prepared the scheme plans and detailed cost.

Providing a secure supply from the local HV network would involve establishing a new customer substation with an HV metering unit and an extension to the local HV network by

¹ www.northernpowergrid.com/demand-availability-map

² www.northernpowergrid.com/help-and-information/getconnected/how-do-i-get-connected/what-are-the-electricity-connection-guaranteed-standards



installing 250m of 11kV cable (2 x 125m cables). The installation of the majority of this cable was within the public highway, with a short section installed on the customers' own site. The customer completed this section of excavation and reinstatement.

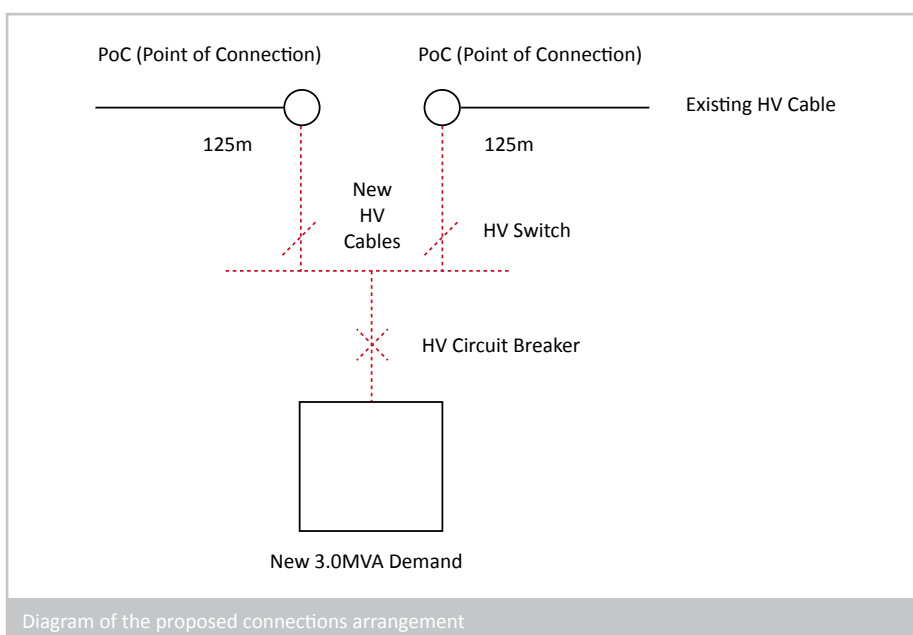
Although the majority of our excavation work was in the public highway, we had to secure our legal right to remain on the customer's private land, including rights of entry to work on the equipment at any time in the future. We have published guides and information on our website that explain what's involved in working on your land.

Our engineer issued a formal convertible connection offer to the customer, including plans, within 29 working days of receiving the customers' application.

The convertible connection offer gives the customer all the information they need to make an informed decision about whether they want to use Northern Powergrid or an Independent Connections Provider (ICP) to install their new connection. The customer can either accept the convertible quotation or provide the point of connection (PoC) to an ICP to obtain a competitive quote for the contestable works. We publish data on our average time to issue a connection offer on our website.

Working on your land

To ensure our customers receive a secure and reliable electricity supply, we sometimes need to carry out on privately owned land. Before we can do this we need to obtain all the appropriate legal permissions and this can sometimes impact on the time it takes to deliver a new connection. There is information on our website about working on your land. We have also published land rights guides which explain the process.





The connections charge was broken down as follows:

Description	Contestable cost*	Non-contestable cost**
Engineering time and metering	£1k	£2k
Legal costs	£0	£1k
Substation plant	£21k	£0
Civil works	£0	£1k
Installation of cables	£29k	£1k
Total cost	£51k	£6k

***Contestable** - those tasks that other suitably accredited ICP or IDNOs may undertake.

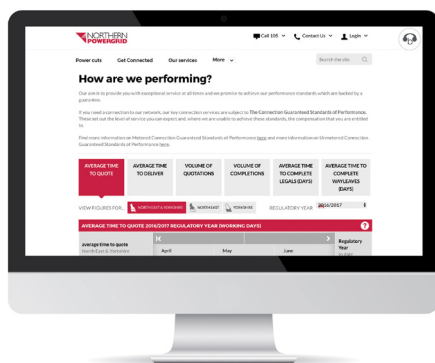
****Non-contestable** - those tasks that only Northern Powergrid may carry out.

A 4% margin was applied to all contestable work in line with Ofgem's competition test submission. This states that where a DNO has passed the appropriate market segment, they may charge an unregulated margin on contestable elements (though no less than 4%). Northern Powergrid passed the competition test in the demand HV works market segment and has decided to continue levying the minimum 4% regulated margin in this particular market segment.

Acceptance

- the customer sent us their formal acceptance of our offer and full payment within the 90-day validity period and the scheme was allocated to the connections delivery engineer.
- our engineer contacted the customer to agree the timescales of the connection and programmed the works in line with their project plan.
- prior to legal completions, the engineer ordered the plant required for the connection, and the supplier confirmed that the delivery time was 12 weeks.
- the engineer planned the cable route and liaised with the Local Authority on any traffic management, notices etc. required
- the week before the substation plant was ready to be delivered to site, the cable installation works were completed. On the agreed date, the connection delivery engineer contacted the customers' authorised person and the substation was installed and connected.

A typical connection of this type will typically take 24 weeks to complete from acceptance, for further information visit our [how are we performing](#)³ web page.



Additional costs that schemes may encounter:

Sometimes we need to reinforce the existing network before we can accommodate a new connection.

This could be because:

- the cable is not large enough to provide the capacity, or
- the cable is not large enough to provide the supply within statutory voltage limits

In certain situations, we may fund some of the cost of reinforcing the existing network so that the customer only has to pay part of the total cost. The contribution the customer makes will vary according to the size of their connection.

Sometimes, the timescales associated with network reinforcement can exceed the standard timescales for connecting a new substation. When this occurs, we work with our customers to help them understand the scope of the work involved and how this will impact their proposed connection date.



The project was completed on time and within budget.



³ www.northernpowergrid.com/performance-dashboard/average-time-to-quote/north-east-yorkshire

EXAMPLE 2:

A new connection for a 3MW solar photovoltaic (PV) generation scheme



A customer applied requesting to connect 3MW of photovoltaic generation on their land. The customer asked for a full connection offer.

The customer had used our [generation heat maps](#)⁴ to determine that the area of land they are considering has a low number of network constraints. They submitted an online application to install generation in accordance with G59 using the online application process.



The customer submitted their application online. The online application tool walked them through the process and ensured they provided us with the following important information:

- contact details – name, postal or email address, and telephone number
- full address and postcode
- a site location plan, indicating site boundary and ownership details
- the location of the proposed meter point
- load details including information on the 3000kW generation they are proposing to install the specification of the generating plant and operating characteristics

Assessing the application

The customer's application was given a unique reference number and allocated to an engineer for assessment. The guaranteed standard allocation was ECDGS3B which means we will provide the customer with a connection offer within 65-working days of receiving all the information we need to make an offer.

We published guides and information on our website to help customers understand our guaranteed standards of performance.

The engineer contacted the customer to discuss the final connection requirements, including the location of the new substation and to confirm that they required an unsecured connection which we would provide by installing a single 11kV feeder back to the nearest primary substation.

The engineer's assessment included:

- checking the surrounding HV network to determine if it can accommodate a generator of this size
- voltage rise calculations to ensure that the operation of the generator would not cause the voltage of the network to rise too much
- fault level calculations to ensure the current flow in the event of a fault is not too great as the generator will add to it.
- voltage step change calculations to ensure when the generator starts and stops generating, it does not cause voltage quality issues, and;
- earthing studies undertaken to ensure the rise of earth potential at the substation would remain within safe limits in the event of a fault.



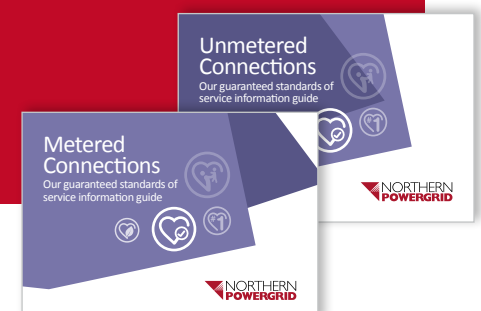
Guaranteed standards

Average prices and timescales to deliver a connection can be found on our website at:

www.northernpowergrid.com/guide-prices-and-timescales/

The service is covered by a guaranteed standard set by our Regulator, Ofgem. These are known as the Electricity Connections Guaranteed Standards. We have published guides to help our customers to understand the;

- [Guaranteed standards for metered connections](#)
- [Guaranteed standards for unmetered connections](#)



⁴ www.northernpowergrid.com/generation-availability-map

The assessment confirmed that the existing Primary Substation could be modified to provide a new dedicated High Voltage (HV) circuit for the connection and the engineer prepared the scheme plans and detailed cost.

Providing an unsecure supply from the nearest Primary Substation would involve establishing a new customer substation with an HV metering unit, a 400m dedicated 11kV cable and the installation of a new 11kV circuit breaker at the Primary. The installation of over half of this cable was the adopted roadway, with the remainder in footpath and a short section within the customers' land, the customer completed this section of excavation and reinstatement.

Although the majority of our excavation was in the public highway, we had to secure our legal right to remain on the customers' private land, including rights of entry to work on the equipment at any time in the future. For further information on land rights visit our website.

The engineer issued a formal convertible connection offer, including plans, within 34 working days of receiving the customers' application.

The convertible connection offer gives the customer all the information they need to make an informed decision about whether they want to use Northern Powergrid or an ICP to install their new connection. The customer can either accept the convertible quotation or provide the PoC

to an ICP to obtain a competitive quote for the contestable works.

We publish data on our average time to issue a connection offer on our [how are we performing](#)⁵ web page.

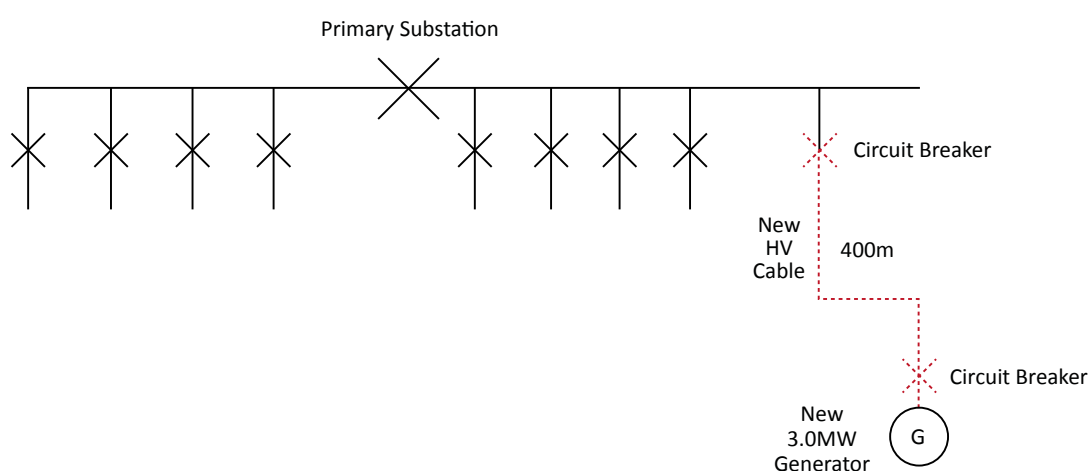
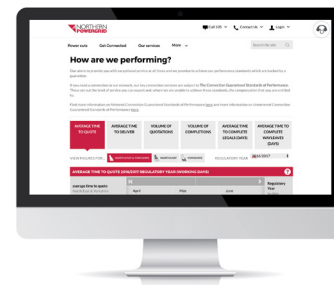


Diagram of the proposed connections arrangement

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The connections charge was broken down as follows:

Description	Contestable cost*	Non-contestable cost**
Engineering time and metering	£2k	£3k
Legal costs	£0	£1.5k
Substation plant	£29k	£132k
Civil works	£0	£1k
Installation of cables	£60k	£0.5k
Protection	£0	£10k
Total cost	£91k	£148,000

*Contestable - those tasks that other suitably accredited ICP or IDNOs may undertake.

**Non-contestable - those tasks that only Northern Powergrid may carry out.

⁵ www.northernpowergrid.com/performance-dashboard



A 4% margin was applied to all contestable work in line with Ofgem's competition test submission. This states that where a DNO has passed the appropriate market segment, they may charge an unregulated margin on contestable elements (though no less than 4%). Northern Powergrid passed the competition test in the demand HV works market segment and has decided to continue levying the minimum 4% regulated margin in this particular market segment.

Acceptance

- the customer sent us their formal acceptance and full payment within the 90-day validity period and the scheme allocated to the connections delivery engineer.
- our engineer contacted the customer to discuss and agree the connection timescales, and programmed the works in line with their project plan.
- prior to legal completions the engineer ordered the plant required for the connection, and the supplier confirmed the delivery timescale was 24 weeks'.
- the engineer planned the cable route and liaised with the local authority on traffic management, notices etc.
- the month before the substation plant was ready for delivery to site, the cable installation works were commenced. On the agreed date, the connection delivery engineer contacted the customers' authorised person and the substation was installed and connected.

A typical connection of this type will take 50 weeks to complete from acceptance, for further information visit our [how are we performing](#)⁶ web page.

Additional costs that schemes may encounter:

Occasionally generation connections will need up-stream reinforcement such as an EHV or grid reinforcement.

This may be because of:

- voltage rise issues, or;
- fault level contribution, or;
- voltage quality issues

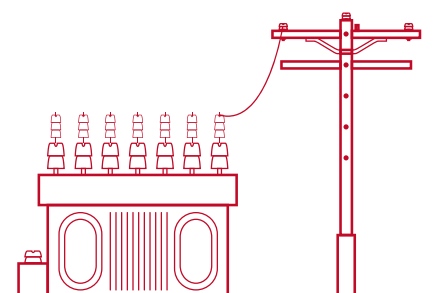
In certain situations, we may fund some of the cost of reinforcing the existing network so the customer will only pay part of the total cost. The contribution the customer makes will vary according to the size of their connection.

Sometimes the timescales associated with network reinforcement can exceed the standard timescales for connecting a new substation. When this occurs we will work with our customers to help them understand the work involved and how this will impact their proposed connection date.



The connections project was completed on time and within budget.

⁶ www.northernpowergrid.com/performance-dashboard



NORTHERN POWERGRID CONNECTIONS CASE STUDIES

CONNECTIONS ENQUIRIES

 0800 011 3433

 getconnected@northernpowergrid.com



www.northernpowergrid.com

