

The background of the entire page is a photograph of two power line workers in safety gear (hard hats, orange vests, and tool belts) working on a wooden utility pole. One worker is on a yellow ladder, and the other is positioned lower on the pole. They are surrounded by a complex network of power lines and insulators. In the background, a large metal lattice tower is visible against a blue sky with some clouds. A green curved graphic element is positioned in the top right corner, containing the company logo and a small illustration of a city skyline with power lines.

**electricity**  
**north west**

Bringing energy to your door

# An introduction to the electricity grid

# About this guide

This guide provides an easy-to-read introduction to how the electricity grid works in Great Britain.

It explains how power is distributed to homes and businesses, and looks at some of the major changes happening in where our power comes from and how we use it.

The guide is aimed at anyone with an interest in the workings of the electricity network, including individuals and communities thinking about setting up their own local energy projects.

## About Electricity North West

We're the North West's 'distribution network operator'.

We maintain the overhead power lines and underground cables that transport electricity to your door.

We don't generate electricity, and our name isn't on the top of your bill, but around 16% of a typical household electricity bill goes to fund the network we operate.

We're the only distribution network operator in the North West, and we're held to account by Ofgem - the UK's energy regulator. Our business plan for 2015-2023 contains more than 40 performance targets that we have agreed to deliver, and our spending is closely controlled to make sure we offer excellent service and value for money.



# Our network



The total length of  
overhead power lines  
we look after

**13,000km**



The total length of  
underground cables  
we maintain

**44,000km**



The size of the area  
we serve in North West  
England

**12,500km<sup>2</sup>**

**£1.8  
billion**

The amount we will  
invest in the network  
between 2015-2023

**£79.04**

The average amount,  
per electricity bill, that goes  
towards our distribution service

**30%**

The increase in  
network reliability  
since 2002

## Supporting community and local energy projects

As the UK transitions to a low carbon future, we expect to see a growth in community and local energy groups in the North West.

We are already working closely with many of these groups, so that we can share knowledge and opportunities.

Our community and local energy strategy sets out how we intend to develop these relationships, as the energy landscape changes. To view the strategy in full visit [www.enwl.co.uk/communityandlocalenergy](http://www.enwl.co.uk/communityandlocalenergy).



You can contact us direct to talk about your project or learn more about the opportunities in this growing sector. Email us at [Communityandlocalenergy@enwl.co.uk](mailto:Communityandlocalenergy@enwl.co.uk) or complete the contact form on our website [www.enwl.co.uk/communityandlocalenergy](http://www.enwl.co.uk/communityandlocalenergy)

# How the grid works

The electricity grid is the network of overhead lines and underground cables that carry electricity from where it's generated, such as a power plant, to your home or business.

Electricity can't easily be stored in large amounts, so the grid needs to be highly responsive – reacting in real-time to customer demand to generate and transport electricity to where it's needed.

## Structure of the industry



Electricity  
Generation

Most electricity is generated at large power plants and generators and wholesalers sell electricity to the market.

Fossil fuels such as coal and gas still account for almost half of electricity generation, but the role of renewable energy is increasing.



Transmission

Power enters the transmission network which in England is operated by National Grid.

They are responsible for ensuring the country's transmission network is stable and secure and are responsible for transporting power throughout the country at 400,000 volts or 275,000 volts.



Electricity  
system operator

National Grid also have a separate company acting as the system operator, which is responsible for balancing the country's supply and demand in real-time.



Distribution

Power is then stepped down in substations to lower voltages, and transported by one of the local distribution networks, such as Electricity North West, so it can be used safely in homes and businesses.



Electricity  
Usage

Your energy supplier buys electricity from the market and sells it onto you. You pay your bill to one of these companies who then pay for the generation, transmission, distribution and billing of your power.

# Keeping energy flowing

Meeting customer demand for electricity is a complex and dynamic process. There are three main challenges:

**Forecasting demand at a national level:** National Grid has to anticipate likely need for electricity, based on a wide range of factors, as well as reacting in real time to fluctuating demand.

**Maintaining a steady voltage:** the electricity network is rather like the water network: it's all about balance. Just as water pipes require a regular pressure to avoid bursts, we need to maintain a steady voltage through our electricity wires, to avoid damaging them.

**Responding to power cuts:** when an overhead power line, or other part of the network gets damaged (for example, due to severe weather), we use a combination of technology and operational teams to find and fix problems to restore power as quickly as possible.



This photo was taken at Ravenglass in Cumbria during Storm Ali in September 2018. When there is damage to the network, power is cut automatically for safety. It can only be restored once the damage has been repaired.



# Meeting demand - now and in the future

With the UK committed to reducing carbon emissions by 80% by 2050, we all need to reduce our reliance on fossil fuels and change to renewable sources of power.

The big challenge is how to meet the increased demand for renewable electricity, while keeping bills affordable and maintaining reliable supplies.

It is clear that we cannot simply build our way out of the problem by expanding the network exponentially - as customer bills would rapidly become unsustainable.

Instead, we need a more innovative approach, to get more from the existing network.

For more information visit [www.enwl.co.uk/innovation](http://www.enwl.co.uk/innovation)

## Flexible services

One of the ways that we can manage the demand on our network is through the use of Flexible Services. We're offering customers a financial payment if they can be flexible and adjust how much electricity they consume or generate in one of our requirement areas. In return, they'll receive financial payment and will be helping to support their local distribution network.



For more  
information visit  
[www.enwl.co.uk/  
flexible-services](http://www.enwl.co.uk/flexible-services)

# Responding to a new electricity landscape

Great Britain is entering a period of major change in the way electricity is generated, stored, transported and traded.

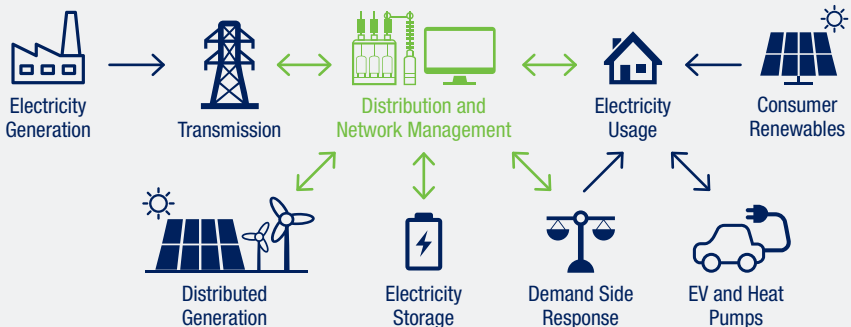
The traditional 'top down' model, where electricity flows from large power plants, via the national transmission system, to our low voltage network and on to homes and businesses, is changing.

In its place, we are seeing the emergence of a decentralised model, in which local producers generate green energy, and supply it to communities on their doorsteps.

**This has big implications for our role in the system - what used to be relatively simple...**



**...is becoming far more complex and multi-directional**



## The changing role of electricity distributors

As more local generation is connected to the local distribution network operator (DNO), we are taking on a new distribution system operator (DSO) role for the distribution network. Much like National Grid's system operator role for the national transmission network but at a local level.

# Making the change

The North West region is seeing huge economic growth and this, coupled with decarbonisation will greatly increase demand for electricity. The drive for de-carbonisation, set by the terms of the Paris Agreement on climate change, places great emphasis on electricity as an energy source, with people relying on it more and more to power all elements of their lives, from smart technology in homes, to electric vehicles.

It is vital that we ensure sufficient power is available to drive the region's economy and decarbonisation agenda. Electricity North West invests in the energy infrastructure to ensure that enough power is available at an affordable price and in an environmentally sustainable way.

We're at the forefront of energy innovation, working with local communities, key stakeholders and expert partners to ensure everyone has the power they need when they need it.



For more information visit [www.enwl.co.uk/dso](http://www.enwl.co.uk/dso)



# Getting your project connected

Our dedicated connections team can get your electricity generation project connected to our network.

We are on hand to help you from your first enquiry to final sign-off - providing support and advice every step of the way.

The more we know about your project, the more we can help.

You can find out more information on our website: [www.enwl.co.uk/get-connected](http://www.enwl.co.uk/get-connected) or contact us via email [connectionapplications@enwl.co.uk](mailto:connectionapplications@enwl.co.uk).



## Heat maps

To help you identify the best points to connect to our network, we are introducing heat maps.

These highly visual maps are colour coded to show areas where connections can be made without the need for significant network reinforcement.

Maps will be updated regularly, providing an 'at a glance' indicator to help your decision-making process, in the early stages of your project.

To view our heat maps visit [www.enwl.co.uk/heatmaptool](http://www.enwl.co.uk/heatmaptool)

# Keep up to date

If you are developing a community or local energy project,  
please get in touch to discuss your plans by emailing  
[communityandlocalenergy@enwl.co.uk](mailto:communityandlocalenergy@enwl.co.uk)

For more information about community and local energy and to sign up to  
our newsletter visit [www.enwl.co.uk/communityandlocalenergy](http://www.enwl.co.uk/communityandlocalenergy)



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