

## Strategic direction statement

How our network will develop  
in the period to 2050



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# Welcome



***"Our company purpose is 'to be the leading energy delivery business' and we plan to efficiently invest to achieve this."***

Welcome to Electricity North West's Strategic Direction Statement. The aim of this document is to explain our role in the energy industry, the services we provide, and the assets that we own. It will then outline how we manage our assets and the basis of the long-term investment plans for our network to 2050 and so give an insight into the potential development of our services and network.

It builds on the stakeholder consultation process we have been operating for the past three years which led to our current Network Investment Plan and is designed to act as a single point of reference for our future outlook.

Our network has developed considerably since the first local authority networks were established in the late 19th century, and we believe that the next 40 years will see the biggest changes since those local companies were combined to form the North Western Electricity Board in 1948.

These changes will be driven primarily by the move to a low-carbon economy, but many of our current drivers, such as looking after our existing network, growth in demand and providing a reliable service to our customers, will continue to be of great importance to us.

As with all forecasts over a long timeframe there is considerable uncertainty associated with these projections, but the aim of this document is to provide our view of changes in the energy landscape. Its intention is to be informative and focused around a central view rather than a discussion of all possible futures.

For further information on our shorter-term view we have published a Network Investment Plan document which gives more detail on our plans for the period from 2010 to 2015. We also intend to publish our Environment, Social and Governance plans in 2011 which will give more details on some of our plans as a good corporate citizen in the North West community.

Our company purpose is 'to be the leading energy delivery business' and we plan to efficiently invest to achieve this. This aspiration can only be achieved in partnership with our stakeholders and we would welcome any comment on our plans and also any suggestions as to how we can work together to develop a sustainable energy delivery future for the North West.

*We would appreciate any feedback tailored to the questions in blue (like this paragraph) throughout the document, or indeed any feedback or input in relation to how our business needs to change to serve customers in the future. Please contact us using the details listed on the final page*

**Steve Johnson**  
Chief Executive Officer

# The electricity supply industry

Our network covers a diverse range of terrain and customer mix from isolated farms in rural areas, to areas of heavy industry, urban populations and city centres.

## Industry structure

The electricity industry in Great Britain is divided into four main sectors:

- The **generators**, who own both the large power stations and smaller renewable generators. The generators produce electricity from a variety of fuel sources.
- The **transmission companies**, who own and operate the 400kV and 275kV transmission network that links the major power stations and transports electricity in bulk across the country. National Grid Electricity Transmission is responsible for the transmission network in England and Wales.
- The **distribution companies**, who own and operate the lower voltage electricity network, connecting the smaller power stations and the national grid to every electricity customer in Britain. Originally there were 14 Distribution Network Operators (DNOs), but these have been joined by a number of smaller Independent Distribution Network Operators (IDNOs).
- The **electricity suppliers**, who buy the electricity produced by the generators, sell that electricity to their customers and pay the network operators for the transportation of that electricity across their networks.

The electricity market is regulated by the Gas and Electricity Markets Authority (GEMA) which governs and acts through the Office of Gas and Electricity Markets (Ofgem). Distribution operators are directly regulated by Ofgem and their charges for use of their networks are subject to a price control mechanism.

Electricity North West is one of the fourteen regional DNOs and is a private limited company registered in England and Wales. We are owned by a consortium of funds controlled by the Commonwealth Bank of Australia and IIF International Holding GP Limited which is a constituent of JP Morgan Infrastructure Investments Fund.



## Our assets and key facts

In simple terms our network is made up of overhead lines, underground cables and items of plant, such as switchgear and transformers, which are used to distribute electricity to customers' premises.

The bulk of electricity enters our network from the National Grid at Grid Supply Points. It then travels through our 132kV network to a substation where the voltage is transformed to enter our 33kV network. Similar transformations take place from 33kV to HV (high voltage) and from HV to LV (low voltage).

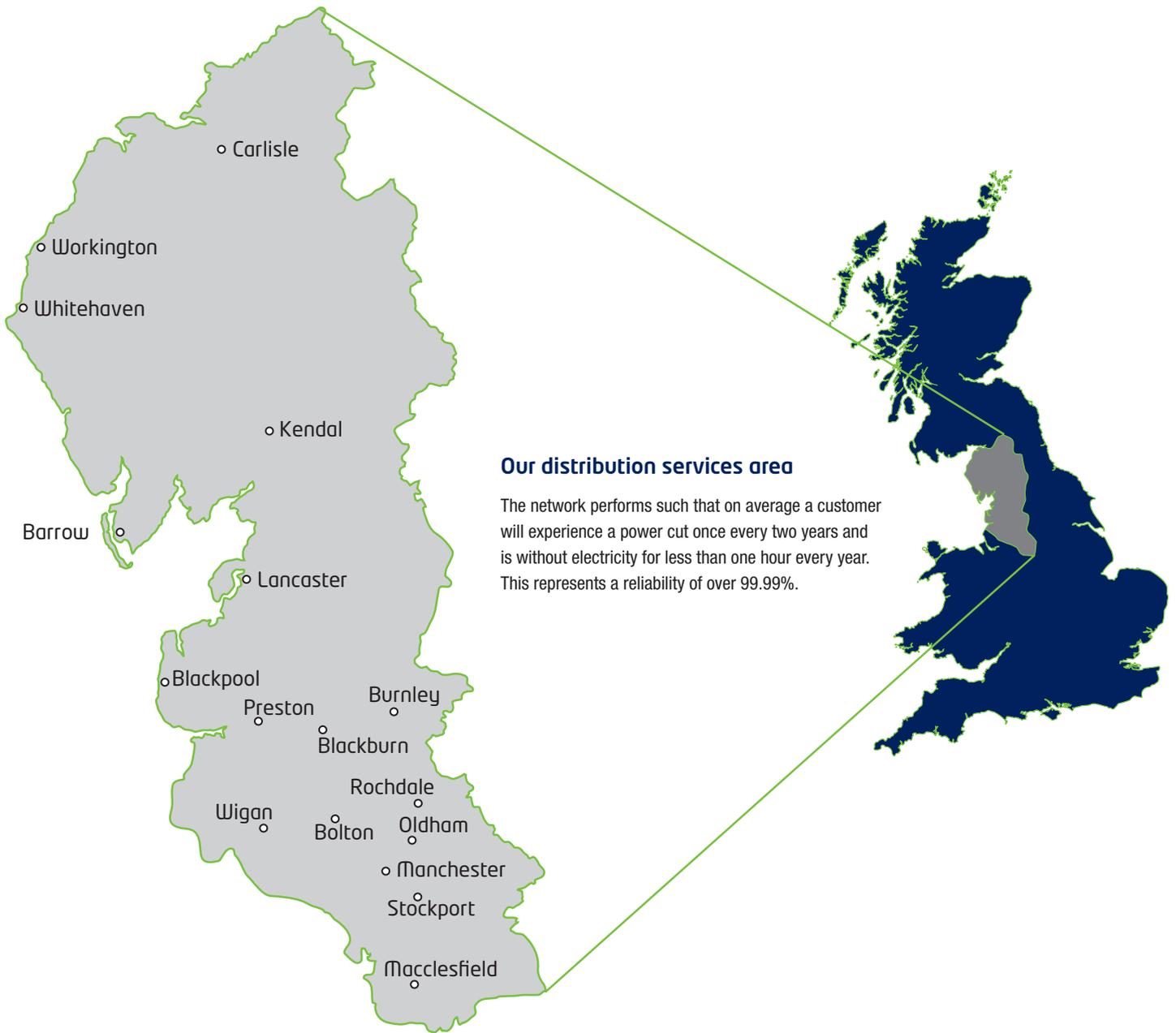
Our network comprises the following key assets:

- around 13 000 km of overhead lines;
- almost 44 000 km of underground cables;
- almost 84 000 items of switchgear; and
- more than 34 000 transformers.

Through this network we deliver over 25 terawatt hours of electricity each year to more than 2.4 million customers premises across an area of 12 500 square kilometres.

Our network covers a diverse range of terrain and customer mix from isolated farms in rural areas, to areas of heavy industry, urban populations and city centres.

As a rough guide, about 55% of our customers live in Greater Manchester, 30% in Lancashire and 10% in Cumbria, with the remainder in parts of Cheshire, Derbyshire and North Yorkshire.



## The electricity supply industry contd

### Where our income comes from and what we use it for

Other than charges for new connections to our network, we have no direct financial relationship with customers connected to our network. We charge electricity suppliers for the use of our network and the suppliers pass these costs on to their customers. Typically we account for around 15% of the final electricity bill for domestic consumers.

The amount of income that we receive from suppliers is governed by a price control which is currently subject to a review every five years. At the price review, we submit our business plan for the period to our regulator, Ofgem. Ofgem analyses our submission and compares it to those of the 13 other DNOs, together with data from other comparable industries. Based on this analysis they then decide how much revenue we are allowed to recover from customers in each year of the price review period under discussion.

Using these revenues we raise the finance to operate and maintain the network, to replace existing assets and to build new ones. This is undertaken whilst at all times focusing on the three industry-wide challenges of securing a low-carbon economy, security of energy supply and efficient delivery for our customers.

We are incentivised to reduce the number of interruptions that our customers suffer and to reduce the average length of interruptions. We are also incentivised to reduce the amount of electrical losses from our network.

We also have a responsibility to look after our network in the long term. From 2010, we have reported on the condition of our network (using Health Indices – HI) and its loading (using Load Indices – LI). Through the monitoring of these indices we will ensure that the overall condition of our network is being maintained in such a state that we can continue to provide a high quality service to our customers.

### The changing face of economic regulation

Since privatisation in 1990, distribution companies such as ours have been subject to an “RPI-X” form of regulation, which is designed to encourage efficiency. The amount of revenue that companies are allowed to collect from customers is increased by RPI less an efficiency factor “X” each year, encouraging them to reduce costs.

In March 2008, Ofgem launched a comprehensive review of the 20-year-old framework and made its recommendations in July 2010, stating:

***“The ‘RPI-X’ method has served consumers well delivering lower network prices, £35 billion of increased investment and significant improvements in network reliability since the companies were privatised 20 years ago. However, there are real risks that the approach will not be able to cope with the nature and pace of change needed in energy networks if Britain is to make the transition to a low-carbon economy.”<sup>1</sup>***

They have proposed a new approach for sustainable network regulation, which will be delivered by the RIIO model where:

**Revenue = Incentives + Innovation + Outputs.**

Under the RIIO model there is a much greater emphasis on companies playing a full role in developing a more sustainable energy sector and delivering value for money network services for customers today and in the future.

#### Key features of the RIIO model include:

- delivering outputs that reflect what consumers want
- price controls lengthened to eight years to encourage a focus on longer-term needs
- higher returns for companies that deliver, and deliver at a lower cost
- stimulating innovation
- spreading costs fairly between today’s and tomorrow’s consumers

A key change under the RIIO model is a move to setting the outputs that network companies are expected to deliver. These outputs act as a ‘contract’ between the network companies and their customers. Under the RPI-X formula, network companies face some financial rewards or penalties relating to some aspects of their performance, for example restoring supplies following power cuts. However, this system will become much more extensive under the RIIO model and will be central to the regulatory framework.

Our next price review, starting in 2015, will embody these principles and we aim to continue to play a leading role in developing both our plans and the RIIO framework within which these plans will be assessed.

<sup>1</sup> Ofgem Fact Sheet – Re-engineering network price controls – 27 July 2010

## Drivers for change on our network

There are many factors which will influence the development of our network to 2050. Currently there is uncertainty about the extent to which each of these factors will materialise. The extent to which the factors become reality and the interplay between them will define how our future network will look.



We have identified the key components driving our network development as being:

- Changing customer expectations and needs.
- Stewardship of the existing network.
- Regional development and growth.
- Moves to a low carbon economy.
- Introduction of electric vehicles.
- Adapting to the impacts of climate change.
- New technology.

Many of these themes will be interlinked so our approach, policies and procedures will be modified to incorporate the new factors into our standard ways of working.

In developing our future forecasts we have taken note of the Long-term Electricity Network Scenarios (LENS)<sup>2</sup> project, which set out five plausible electricity network scenarios for Great Britain in 2050. The variations in the scenario for distribution companies largely relate to the size of the impact of the following factors:

- Level of consumer activity – both in generation and demand response.
- New players and new roles in distribution networks – such as energy service companies, microgrid system operators, and active consumers.
- More dynamic and even bidirectional power flows as a result of new activities in distribution networks.

We have also noted the '2050 Pathway Analysis' and 'Annual Energy Statement' documents published by DECC in July 2010. The pathway analysis presents a number of different scenarios as pathways and provides a framework through which to consider some of the choices and trade-offs which we will have to make over the next forty years.

We have used the LENS and Pathways themes to shape our thinking of the major external factors, but have developed our own view of the world. In each case, we have tried to assess:

- likely external changes, either to the sector, or to wider customer and societal behaviour;
- our proactive strategies to shape the future; and
- the effect of the above two on the shape and operation of the network, together with indicative investment requirements.

These differing themes will be explored in the following pages.

*Have we identified the right sources of information to inform our view of the future?*

*Are there any specific issues that you believe we have overlooked?*

*Do you believe that there might be any development in the use or production of energy, particularly electrical energy, that we should take specific account of in our planning?*

<sup>2</sup> Electricity Network Scenarios for Great Britain in 2050 Final Report for Ofgem's LENS Project (Ref. No. 157a/08) November 2008



# Customer satisfaction

We intend to continue the process of stakeholder consultation to ensure that our strategies will deliver the services that customers require.



## Customer expectations and priorities

All investment on our network is designed to ensure that our customers continue to receive the levels of service that they expect from us and we are working to ensure that we offer the services that customers will require in the future.

To develop our Network Investment Plan, in 2009 we held Stakeholder Workshops so that we could find out what our customers wanted. Customer representatives were asked to prioritise from a list of network activities based on the impact that those activities would have on customer bills.

The results of this exercise were reported in our 2009 'Consultation Response Document' and submitted to Ofgem as part of the price review negotiations. They can be summarised as follows:

Higher priority	Medium priority	Lower priority
Enhanced flood protection	Undergrounding of overhead lines for visual amenity in designated areas	Increased resilience to storms
	Improved resilience in Manchester (High Impact Low Probability incidents)	Improved service received by worst served customers
		Reducing power cuts
		Replacing oil-filled cables

Where activities were judged to be lower priority, this did not necessarily mean that stakeholders did not want to see the work done, but they would rather spend money in areas where there will be a bigger impact on customers.

We intend to continue this process of stakeholder consultation to ensure that our strategies will deliver the services that customers require. This will include consultation with both end customers and stakeholders within the region, seeking to determine customer priorities and willingness to pay for future enhancements.

*Are the priorities above complete? Should we be including any other issues that are important to customers?*

*Do you believe the prioritisation is still broadly correct, or do you believe there is a different order?*

## Guaranteed Standards of Performance

Guaranteed Standards are standards of customer service backed by a guarantee – customers receive a payment, either directly from us or through their electricity supplier, if we fail to meet these standards. The standards are the same for all distributors and include restoring supplies within 18 hours, giving sufficient notice of planned power cuts and responding to voltage quality issues.

There are exceptional circumstances in which the Guaranteed Standards may not apply, including events beyond our control such as severe weather or industrial action.

New standards for metered and unmetered connection services were introduced in October 2010 relating to the provision of estimates, the provision of quotations, the accuracy of quotations and the scheduling and completion of work. If we fail to meet any of these standards we will make a payment to the customer.

Our aim will always be to minimise the number of payments we make, by providing customers with the levels of service they expect. We will also consult with customers and work with Ofgem to identify any new or changed standards that might be required to meet customers' future priorities.

*Do you believe there are any other specific areas or measures where we should be guaranteeing the level of performance?*

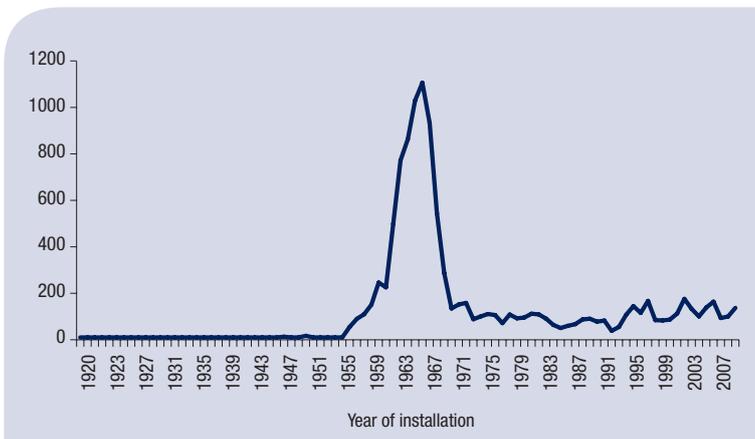
*We would be interested to hear of any views you may have on how our customer service can be measured, and what aspects of service you particularly value.*

## Reliability and availability

The major area of investment for at least the next 20 years is likely to remain the replacement of the existing legacy network, but other drivers may mean that this is not necessarily through like-for-like replacements.

### Stewardship of the existing network

Historic development of the network has reflected UK economic cycles, including the post-war prosperity boom in the 1950s and 1960s, so much of our network is now over forty years old. This can be seen in the chart below which shows the age profile of our ground mounted high voltage circuit breakers.



Traditionally, asset owners have chosen to replace individual pieces of equipment based largely on considerations of age. Electricity North West has developed a process of Condition Based Risk Management (CBRM) which is used for our major above-ground assets. An assessment of the condition of the asset is used to develop a probability of failure, which when combined with an assessment of the criticality of the asset allows us to prioritise our investment programme to ensure the maintenance of reliability levels at lowest overall cost.

The prioritisation process is designed to ensure that our investment targets those parts of the network that have the greatest need of some form of intervention. This takes account of a number of factors that cover:

- safety to staff and public;
- condition of the assets;
- environment;
- operating history;
- previous faults on the same type of asset;
- availability of spare parts; and
- local knowledge.

The resultant programme looks for the most efficient and cost effective 'intervention' which will be a combination of:

- doing nothing;
- additional inspections;
- maintenance;
- refurbishment;
- removal (without replacement); and
- replacement

The use of the CBRM approach developed by Electricity North West has reduced our expenditure requirements by tens of millions of pounds over the last 5 years.

We will continue to invest to maintain the overall health of the network, continuing our historically good performance and safety standards. We will also continue to invest in our asset management systems to enable us to model and plan for the future in a manner that optimises the timing and efficiency of any investment we make.

However, even with such careful targeting, replacement requirements are likely to rise over the next 20 years as the extensive first-generation network installed in the mid-20th century reaches the end of its life. Our overhead line network is relatively compact and cheap to replace, however little of our extensive cable network has been replaced and it is unclear how quickly much of this network will deteriorate and require replacing. We are investing in a significant research and development effort to better understand these assets and hence better plan their long-term replacement. Plant items are easier to assess and predict, however many of these existing assets will need to be replaced by assets with enhanced capabilities to address network changes stimulated largely by moves to a low-carbon economy.

*We believe we are best placed to prioritise the replacement of our assets in the most efficient manner to protect the service we provide to customers. Nevertheless we would be pleased to hear any views on how we should manage our assets, or how we can flex our investment to serve customers better.*

### Quality of service

Currently, the main measures of 'reliability and availability' are the number of interruptions of over three minutes and the length of those interruptions.

## Reliability and availability contd

Our performance in maintaining customer suppliers is presented and measured in units known as Customer Interruptions (CI) and Customer Minutes Lost (CML). The interruptions measure, CI, can be thought of as the total number of individual interruptions that an average group of 100 customers suffers in a year. The restoration measure, CML, represents the average number of minutes that a customer will be off supply in a year.



If we meet these targets then the average customer would expect to have a power cut once every 2 years and on average to be off supply for less than an hour a year.

If we fail to meet the targets of performance agreed with Ofgem, the revenue that we are allowed to collect from customers will be reduced by up to £7m, but if we outperform these targets we can collect additional revenue. The targets and incentive rates are reviewed at each price review.

***In the financial year 2010/11 the impact of this incentive is that every time a customer is interrupted for more than three minutes due to a fault it costs us £5 in income foregone, and for every minute that each of those customers is off supply it costs us an additional 25p. This money is not paid directly to affected customers, but is reflected in reduced charges to all customers through their suppliers.***

These average measures have been in place for nearly 10 years now and we continue to seek ways of further improving this level of service. This mainly centres on reducing the effects of faults by the use of new remote control and automation technology; however improvements become increasingly harder as the overall performance improves.

***We believe that the incentive scheme works well and supports our aim to provide good customer service, with continual improvement. However it is important that we regularly validate our view, and we welcome any comments on our performance and on the incentive scheme.***

### Worst served customers

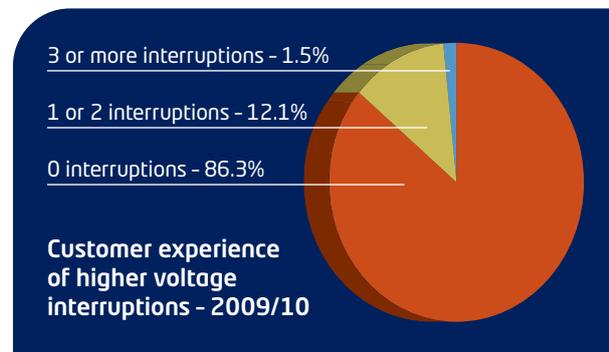
Statistically our customers, on average, will be off supply less than once every two years and for less than an hour each year. In reality the majority of our customers will receive a much better level of service than this, and also some customers will see a much lower level of service.

Quality of Service incentives have been very effective in encouraging companies to improve the average performance of the network, but one anomaly of this approach is that the network which supplies the worst served customers is usually deemed to be uneconomic to improve.

Worst served customers are defined as those who experience 15 or more higher voltage interruptions over a three-year period and a minimum of three higher voltage interruptions in each year.

In the next five years Electricity North West is seeking ways to make a 25 percent improvement in performance for these customers.

We are currently evaluating the most effective ways to improve the service experienced by our 'worst served' customers.



***As can be seen from the chart above, most of our customers will not experience a higher voltage interruption in a typical year, and we aim to maintain this level of performance.***

***For those customers who do have interruptions we are working to ensure that they are back on supply as quickly as possible.***

***The Worst Served Customers initiative aims to improve the customer experience for those customers who are consistently in the 1.5% who have more than three higher voltage interruptions each year.***

***We believe that our service level on average is good and compares well to that of other DNOs, but we would be pleased to receive your views on how worst served customers should be defined, as well as any suggestions on how we should look to improve our overall service to such customers.***



## Safe network services

We are committed to achieving the highest standards of safety for all our customers, employees and contractors.

### Resilience

We have observed over the last few years an increasing focus on preparedness for extreme events, whether stimulated by climate change, security concerns or the experience of real events such as the floods of 2007 and 2009.

The National Security Strategy (NSS)<sup>3</sup> states that civil emergencies, whether in the form of a terrorist attack, or a major accident, or a natural hazard, have been identified as among the four highest priority national risks over a five and twenty year horizon.

One of the high level strategic objectives identified by the NSS is 'ensuring a secure and resilient UK' and a specific task is to provide resilience to the UK by:

- being prepared for all kinds of emergencies;
- being able to recover from shocks; and
- maintaining essential services.

This requires security and resilience of the infrastructure most critical to keeping the country running against attack, damage or destruction; and resilient supply and distribution systems for essential services.

As a provider of Critical National Infrastructure we support these objectives and we work with DECC, the Cabinet Office and other industry participants to ensure preparedness.

As we continue to deliver excellent service under 'normal' conditions, and as electricity becomes even more important in people's lives, we will encourage a focus on greater resilience which could require the development of new methods of risk assessment outside of traditional economic models.

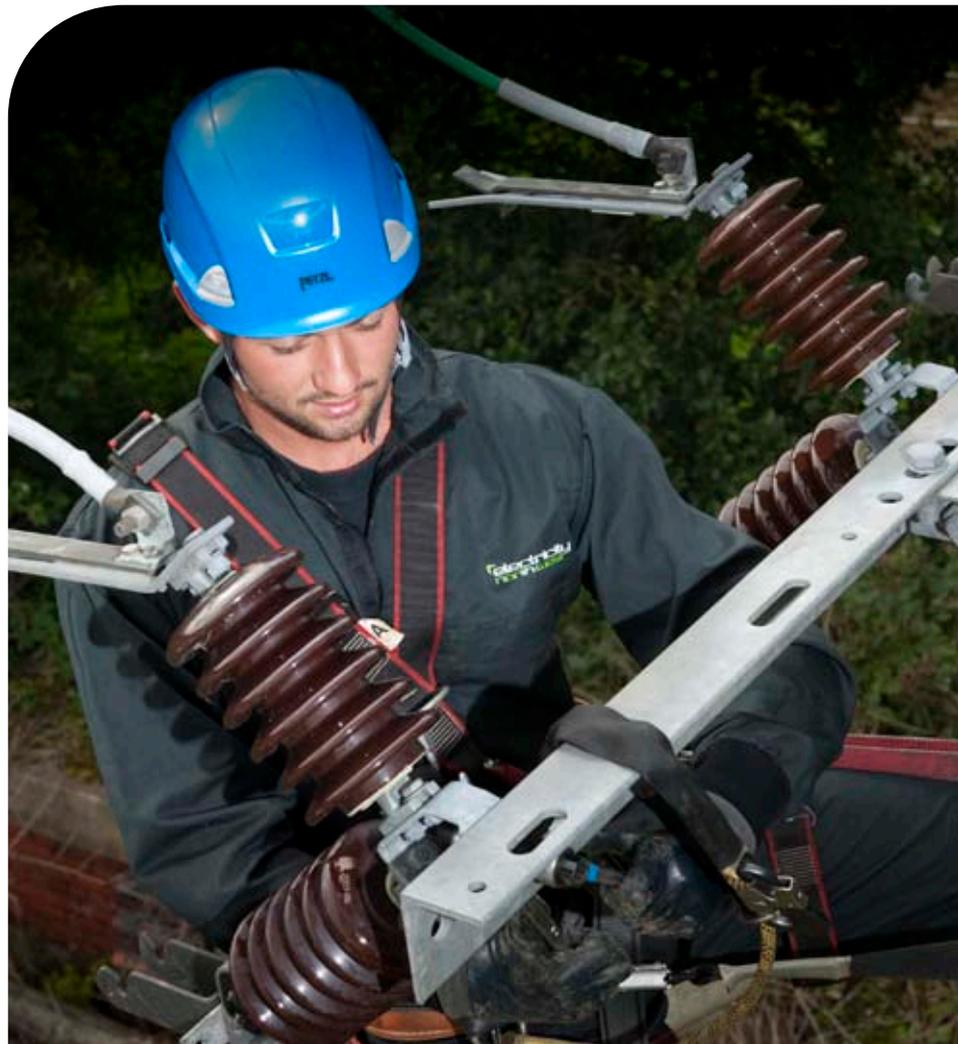
*We recognise that planning for truly exceptional events is hard, and that judgements have to be made about the right levels of investment to guard against extremely unlikely, but catastrophic events. We welcome any views you may have on this subject.*

Whatever changes are required to our network in the future safety will always be the first consideration of any business decision we make. We are committed to achieving the highest standards of safety for all our customers, employees and contractors.

We will ensure that, at a minimum, we will comply with all relevant legislation to protect members of the public.

We do not foresee any major changes in safety legislation, nor do we propose that safety should be subject to any form of comparative assessment between DNOs. We will continue to strive for even higher safety standards and trial the use of new technology and techniques to this end.

*Please let us have any views on our management of safety, particularly the safety of the public from the dangers of electricity.*



<sup>3</sup> October 2010, HM Government: 'A Strong Britain in an Age of Uncertainty: The National Security Strategy' and the 'Strategic Defence and Security Review'

## Connections

### Factors driving growth

As well as maintaining the current performance of our network we also have to plan for changes of use of our network. Whilst energy efficiency measures will act to reduce the amount of energy used, other pressures will act to increase electricity demand. These include:

- population growth and movement;
- economic growth and/or economic regeneration;
- increased use of air conditioning;
- electricity displacing gas as a source of heating; and
- future use of electric vehicles, displacing petrol and diesel.

The increase in population, plus the increased intensity of electrical use is expected to lead to a major expansion in electricity demand. Government estimates suggest that electricity demand could double by 2050<sup>4</sup>. We will have to develop our network to meet this expected growth through a mix of our business-as-usual practices and new approaches where non-traditional loads appear.

### Customer connections

We forecast that growth on our network will continue to be largely driven by demand from customers for new connections to new buildings. Customer connections is a competitive market area with a number of different service providers capable of providing quotations and making new connections to our network. Most connections however will ultimately be adopted as part of Electricity North West's network.

Since October 2010 we have been subject to standards of performance relating to the provision of estimates, the provision of quotations, the accuracy of quotations and the scheduling and completion of work. If we fail to meet any of these standards we will make a payment to the customer.

### Population growth

Figures from the Office of National Statistics predict that the population of our area will increase by 10% over the next 25 years. Growth will be concentrated in Greater Manchester which is expected to see growth of 12% by 2033, with increases of just over 7% in the remainder of our area.<sup>5</sup>

Just over 90% of our customers are domestic, consuming around a third of the electricity used in our area, so we will have to develop our low voltage network to cope with a larger population, living in a higher number of households in urban environments.

### Economic growth

Whilst less than 10% of our customers are commercial and industrial, they consume almost two thirds of the electricity. Their consumption over the last few years has fallen as a result of the economic recession.

In their '2050 Pathways Analysis' work, published in July 2010, DECC have assumed a GDP Growth of 2.5% to 2050, and this is reflected in our assumptions for the North West.

In addition to new connections, we need to reinforce the network where the load from existing connections increases to the extent that assets become overloaded. We are investing effort in developing new tools to predict where these may occur in a more complex environment. We are also carrying out trials of non-traditional responses such as Demand-Side Management (DSM) schemes to defer or avoid the need for network investment.

*Have we identified the right sources of information to inform our view of the future?*

*Do you believe that we are planning a sufficient response to the challenges of the future?*

*Should we be taking any specific actions in relation to energy efficiency, or in measures to help manage customers' use of electricity?*



<sup>4</sup> HM Treasury – Energy Market Assessment – March 2010

<sup>5</sup> Based on Office of National Statistics Subnational Population Projections – 2008 Based

# Environmental impact

In the transport sector the major initiative to reduce CO<sub>2</sub> emissions will be the introduction of electric vehicles. If the take-up of electric vehicles reaches government targets then this will present a major challenge to DNOs.

## Introduction of electric vehicles

It is estimated that the electricity required to travel 80 miles is equivalent to the daily consumption of an average home. We will need to increase the capacity on our network to cope with the added demand from electric vehicles, whilst ensuring that the management of the 'refuelling' electrical load is undertaken in a smart manner, so that the overall load profile would be optimised over the day.

In DECC's pathways work their 'alpha pathway' presents a scenario where vehicles become more efficient and there are breakthroughs in battery technology. This will drive the introduction of significant numbers of electric and plug-in hybrid electric vehicles, so that by 2050, 60% of mileage will be covered by electric and plug-in hybrid vehicles, with 20% covered by fuel cell vehicles.

The government has introduced the 'Plugged-In Places' programme which will fund trials on electric vehicle charging. They are designed to demonstrate how electric vehicle charging will work in practice in a range of different settings as well as testing innovative technologies such as rapid charging, inductive charging and battery swap.

It is planned to install 4000 charging points nationally under the scheme, which will inform the future development of a national recharging infrastructure.

*Electric vehicle development is clearly an important area for us. We would be delighted to hear any views you have of this sector, our role in it, and any specific actions you believe we should be taking now or in the future.*

## Climate change mitigation

To mitigate the impact of climate change we will be working to reduce our own carbon emissions and also to facilitate the connection of low-carbon generation to our network (discussed further in the section on 'Low-carbon economy and smart grids').

In line with many other businesses we will be looking to use energy more efficiently to reduce our carbon footprint, particularly from our buildings and transport. Perhaps the biggest impact that Electricity North West can have will be to reduce the level of electrical losses on our network. Losses are an inevitable consequence of the transport of electricity,

but where it is affordable we will adopt low loss technology to reduce the amount of electricity lost in our network.

We will also work with stakeholders to facilitate the connection of low carbon generation to our network.



## Climate change adaptation

Climate change is expected to result in higher average temperatures, drier summers, wetter winters and a greater incidence of extreme events over the coming years. The Department of Environment, Food and Rural Affairs (Defra) is keen to understand how the country's national infrastructure will cope with these changes in conditions.

Electricity North West is working with other electricity network companies to identify any changes which may be needed to industry standards, and to implement any necessary programmes of work to introduce these changes. We will be reporting the results of this work to Defra under the Climate Change Adaptation Reporting Power from 2011.

The biggest potential impact is expected to be the increased risk of flooding to our substations. We are already taking steps to install new, and improve existing, flood protection to major substations located on floodplains.

Initial studies suggest that other impacts will be of a smaller scale and any necessary modifications to our network will be built into our long-term asset replacement and reinforcement programmes.

*We would be pleased to hear any views that you have on climate change, our role in mitigating it and adapting to it.*

**Electricity North West has supported Greater Manchester's successful bid for funding under the government's Plugged-in-Places programme. In Greater Manchester over 300 charging points will be installed at five 'plug and park' areas and along a number of major routes.**

## Environmental impact contd

### Undergrounding of overhead lines

Traditionally, the decision on whether to use an underground cable or an overhead line to supply customers has been based on considerations of cost, safety and location. Underground cables are significantly more expensive than overhead lines, but it is more appropriate to use them in certain parts of our area.

In conjunction with our stakeholders we established a programme of undergrounding for visual amenity in the price review periods 2005-10 and 2010-15. Up to £1m each year has been available to spend on removing overhead lines and replacing them with underground cables in National Parks and Areas of Outstanding Natural Beauty (AONB), in order to improve the 'visual amenity'.

With this level of funding we would expect to be able to underground an average of 10km each year.

We have worked with our stakeholders to implement programmes of work reflecting local priorities. We will continue to replace existing overhead lines with underground cables in conjunction with relevant parties where funding is available.

*We welcome any views that stakeholders have on our existing plans and on how this initiative should be taken forward.*

### Low carbon economy and smart grids

HM Treasury has stated:

***"To tackle dangerous climate change, the government has set legally binding targets to reduce greenhouse gas emissions by 34% by 2020 and by at least 80% by 2050, compared to 1990 levels."***<sup>6</sup>

They have also stated that:

***"Emissions cuts within the UK energy system will have to be greater than 80%, owing to emissions from other sectors including agriculture and industrial processes, where equivalent cuts may be harder to achieve."***

In the electricity sector reductions will be achieved through:

- the introduction of low-carbon generation, much of it locally produced;
- measures to reduce the overall amount of energy used;



- more intelligent use of the electricity that is used; and
- decarbonisation of heat and transport.

It is probable that much of the low-carbon generation will be small-scale technologies such as wind turbines or photovoltaic cells, which will connect directly to our network rather than the transmission network.

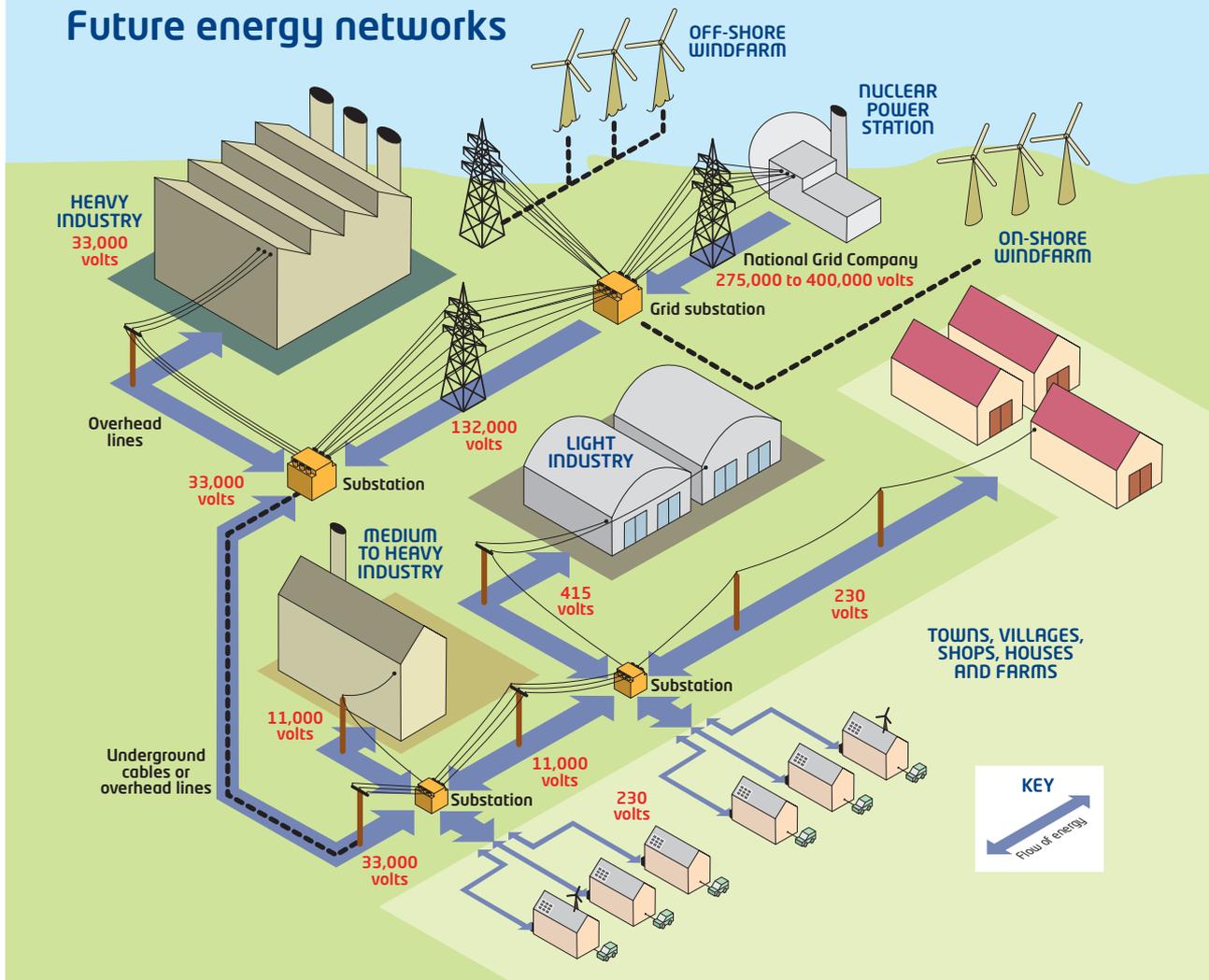
Our network has been historically designed on the basis that the electricity flows in one direction, 'down' through the voltage levels, so the way that the network is designed and managed will need to be changed to facilitate the introduction of significant quantities of local generation.

Decarbonisation of heat and transport has the potential to create significant increases in total units distributed and peak demand for electricity, the timing of which will not necessarily coincide with when local generation produces electricity – for example photovoltaic generation does not generate after dark.

Consequently we will need to change from a passive unidirectional network, to an 'active' network where we actively manage the flows of power. The term for the group of technologies which will enable us to match supply with demand in the optimal manner is a 'smart grid'.

<sup>6</sup> HM Treasury - Energy Market Assessment - March 2010

# Future energy networks



The introduction of smart meters will be one of the tools in the delivery of smart grids. We are currently working with government and industry partners to ensure that the smart metering programme meets our future needs.

There are a wide range of scenarios for the capability and complexity of smart grids. Some issues could include:

- Management of smart domestic appliances to ensure that they are run at times of low demand on the network, whilst still fulfilling their function in a timely manner.
- If the embedded generation market grows significantly then the distribution companies may have to take on the role of system operators, instructing generators when to run, and customers to reduce (or even increase) demand, in order to balance supply and demand. Currently this is only done at the transmission level.
- As well as matching supply with demand, the implementation of demand-side management, where customers agree to reduce load at times of high demand, will also avoid the need to reinforce our network.

The development of smart grids will largely be customer led, but through research projects such as those supported through the Low Carbon Network Fund (LCNF) we will ensure that we can provide the most effective solutions to customers' needs.

We will continue to work with partners to develop smart grid solutions and will look for support through the LCNF.

*We believe that the low-carbon agenda will drive significant change to our business in the near future. We need advice and help from all our stakeholders in finding the right way forward. We expect that future strategy will be informed by significant interaction between us and our stakeholders, and we welcome any views you have now, particularly on how we should engage on these matters in the future.*

## New nuclear in Cumbria

In October 2010 the government announced<sup>7</sup> that two sites in our area are "potentially suitable for the deployment of new nuclear power stations by 2025". These are the existing nuclear sites of Sellafield on the Cumbrian coast and Heysham in Lancashire.

In Cumbria we have significant network assets, but National Grid does not. The new nuclear generators will have to connect to National Grid's transmission network, which may require construction of new lines in areas which we currently use for our overhead lines. We are working with National Grid and the local planning authorities to find an optimal solution for all stakeholders.

## Other environmental effects

Electricity North West will always aim to minimise the effect that our network has on the environment. For example we use oil and gases as insulation in our cables and equipment, and we need to ensure that this does not escape into the environment. In particular we will be looking at options to minimise the release of sulphur hexafluoride (SF<sub>6</sub>) from plant and oil from oil-filled cables. This could involve a future programme of replacement of these assets.

*Are there any other environmental issues we should be addressing?*

<sup>7</sup> DECC - revised draft Nuclear National Policy Statement (EN-6)

## Social responsibility

### Provision of priority services

We maintain a priority services register of domestic customers with additional needs such as pensioners, disabled and those who are chronically sick or have a medical dependency on electricity.

Customers on the register will be provided with additional services free of charge from their supplier and treated as a priority in an emergency. This could include providing alternative heating and cooking facilities in the event of supply disconnection.

*We are continually reviewing the services we can offer to vulnerable customers. Please let us know of any views you have in relation to our current service, or on services we should offer in the future.*

### Education programmes

Electricity North West, as well as its predecessor companies, has always maintained a programme of educational activities. These have focused on public safety, targeting groups ranging from school children to angling clubs.

We will continue to ensure all members of our community are aware of the dangers and benefits of electricity, and develop new materials appropriate to each audience.

*Please let us know if you have any views or requirements for our education programme.*

### Stakeholder engagement

Electricity North West is committed to a programme of regular stakeholder engagement to ensure that future investment:

- meets the requirements of the region and its stakeholders;
- contributes to a low-carbon environment; and
- is sufficiently robust to minimise loss of service due to exceptional events.

We hold regular meetings with stakeholders such as the planning authorities and regional government agencies, and we have run workshops to explain our investment plans and new charging structures to interested parties. For example, in 2010 we hosted a workshop on our vision for smart grids.

We have regular meetings with local authority and parish council representatives and have taken a leading role over the past few years in national forums in discussing environmental issues.

*We plan to continue to develop our interaction with our stakeholders and would welcome individuals and organisations getting in touch to discuss ways in which we may be able to work together in developing a sustainable energy future for the North West.*

One of the ways that we promote electricity awareness is through our TeachingZone website, which contains educational resources for both teachers and children.

It can be found at:  
[teachingzone.org/enw](http://teachingzone.org/enw)

Electricity north west TeachingZone

## TeachingZone

Welcome to the Electricity North West Ltd TeachingZone

Home	>>	Electricity North West Ltd believe that corporate responsibility is about living the values and principles that govern the way we operate as an organisation and behave as individuals within the communities we serve.
Teacher Resources	>>	
Flashover Safety Game	>>	
Safety Film	>>	
Young Ambassadors Programme	>>	Empowerment through education providing clarity of information is crucial if we are to encourage young people to make informed choices and develop innovative ideas in order to achieve a safe sustainable future.
Your Innovations	>>	
Video File	>>	
Photo File	>>	
Latest News	>>	We are committed to supporting the provision of quality education and lifelong learning opportunities for all learners and their communities through the provision of leadership advice, support and technology in the UK.
Useful Links	>>	
Contact Us	>>	

children's CHARITIES



## New technology and innovation

We expect the introduction of new technology to accelerate, over the next 40 years.

Over the last 40 years a wide range of new technology has been introduced, ranging from consumer appliances to items of network infrastructure. We expect the introduction of new technology to accelerate over the next 40 years, and this creates uncertainty in our long-term plans.

nationally to try out new technology, operating and commercial arrangements, with the objective of helping all DNOs to understand what they need to do to provide security of supply at value for money as Great Britain moves to a low-carbon economy.

We are planning to expand our research activities particularly in relation to smart grids and the challenges of future networks. We will be collaborating with a range of local stakeholders to develop bids for LCNF funding.

Through continuing investment in innovation Electricity North West will work with our partners in industry and academia to continue to seek new solutions to network challenges.

**An example of innovation has been the work Electricity North West has undertaken with manufacturers Kelvatek to develop a smart fuse. When deployed it will reduce the restoration time for low voltage transient faults to less than three minutes, where previously an engineer would have needed to visit the site.**

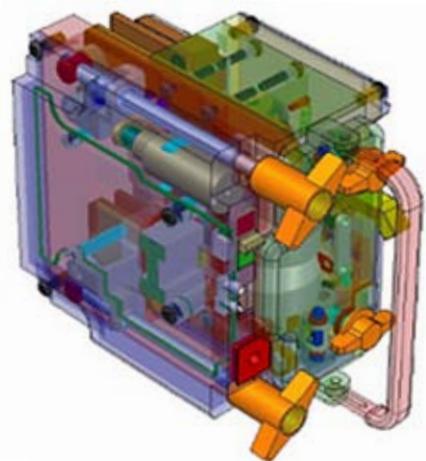


For example, new consumer products may be popularised in the same way that mobile phones, mp3 players and large screen televisions have become commonplace over the past few decades. The introduction of similar types of appliances would serve to drive up demand. Conversely new technologies may be introduced which will make appliances (particularly 'white goods') and our distribution networks more efficient, which will drive down demand.

We expect that our network infrastructure will remain largely the same as it is now, but the introduction of new technologies will help us to manage it in a more effective manner through greater real-time data and a greater ability to operate the network remotely, although the extent of these potential benefits are largely speculation at this stage.

Electricity North West has been active in investing in research and development, spending over £6m in the last five years to support 60 innovative projects.

In 2010 the Low Carbon Network Fund (LCNF) was introduced to promote radical changes in electricity networks. The fund will allow up to £500m to be spent



**Do you believe that our approach to innovation and change is sufficient?**

**Are there other avenues we should be researching in relation to change and innovation?**

## Our vision of the electricity supply industry in 2050

We expect that in 40 years time the physical structure of electricity networks will be largely recognisable as the structure that is in existence today.

### Recognisable, but changing

In summary terms, we expect that in 40 years time the physical structure of electricity networks will be largely recognisable as the structure that is in existence today, but there will be a number of significant changes as we move towards a more sustainable network.

### Driven by what customers want

By 2050 customer expectations will have changed to reflect the standards they have experienced, and the technology available. We expect that customers could have much greater tolerance of short duration outages, say of less than an hour, because of the capabilities of smart appliances and local storage. Conversely, given this tolerance is based on storage, they could have lower tolerance of longer outages.



Electricity will be generated on a large scale predominantly from nuclear and large wind farms, but there will also be significant low-carbon generation owned by customers, or sited close to them.

In order to match the supply of electricity to demand, customers will use smart appliances which respond to price and market signals to run at the optimum time for the customer and the network as a whole. Customers will generally use considerably more electricity for heating and transport, but smart technology will spread the load across the day.

### Implications for energy networks

In order to meet customer expectations, future customer demand and generation will need to be forecast by both distribution and transmission operators. These forecasts will be integrated, in that they will be interactive between transmission and distribution companies.

Large generators will continue to be scheduled by National Grid, but customer behaviour, for both generation and demand will be influenced by signals from transmission, from the energy market, and from distributors. Real-time information will flow up and down the system allowing all parties to modify their signals and behaviours.

We are not forecasting any particular changes for the role that suppliers will play, with them being the key commercial contact for domestic customers. However the smart nature of future electricity networks will mean much greater interaction between suppliers and DNOs at a local level.

### The new distribution company

Distribution companies will have to change to cope with the significant data management issues, both in relation to customer behaviour and in relation to the accuracy of asset data for system operation when dynamically managing power flows in real time.

More automation will be required on the network, particularly items such as:

- remote control switchgear;
- automatic and remote control of voltage via transformer tap-changing or other network equipment;
- automatic and remote scheduling or control of customers' generation and storage; and
- real-time data exchanges and control actions with transmission operators.

This will also necessitate new commercial relationships with National Grid, suppliers and with customers, or their agents.

*Do you support our vision?*

*If not, what do you believe will be different?*

*We would welcome any views or information that helps us refine our vision.*

## Summary

We foresee an exciting future for the electricity network where it will be required to supplement its traditional roles with new uses as part of a national move to a low-carbon economy by 2050. We will also need to consider more carefully the potential effects of extreme events on networks and replace the majority of the first-generation above-ground asset base in such a way as to provide continued excellent service for the rest of the 21st century.

As part of this, we need your input to help us develop our priorities and plans for the coming decades so we can develop a sustainable low-carbon energy sector for the North West together.

We are interested in views on this document and our future plans, particularly whether there are any areas you feel we have missed, or other priorities and factors we should consider.

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Email us at [futurenetworks@enwl.co.uk](mailto:futurenetworks@enwl.co.uk)

Or comment via the link on our website which also includes details of previous stakeholder events:  
[www.enwl.co.uk](http://www.enwl.co.uk)

We look forward to hearing your views.





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