electricity north west

Bringing energy to your door

Electricity North West Strategic Direction Statement 2017

2017

Content

Introduction to this document

Welcome to our Strategic Direction Statement (SDS) which is a major part of our ongoing discussions with stakeholders on how the delivery of energy in the North West of England will develop over the next thirty years.

We are currently delivering against our strategy for the next six years, which is detailed in our Well Justified Business Plan for 2015 to 2023[1]. We now want to look further ahead at the way that the delivery of energy will change in the following decades, particularly concentrating on the period covered by our next electricity distribution price review which is expected to be from 2023 to 2031.

We would like to use the SDS as part of our conversation with customers and stakeholders about future priorities and the areas that you would like us to focus on. We are here to serve our customers and want to better understand the services that our customers and stakeholders would like us to provide in the future, so that we can develop a long term plan to deliver them.

As part of this conversation we plan to update the SDS annually leading up to our next price review submission, which we expect to publish in 2021, where we will set out our investment plans. These will show not just the amount of money that we would like to invest and how we will spend it, but also what that spending will deliver for our customers in terms of outputs and outcomes.

The SDS is structured to give you a brief introduction to our role as a Distribution Network Operator and the regulatory framework that we work in, followed by a discussion of how our current areas of investment could change and then a look our changing role as an energy distributor in the North West.

Throughout the document we will also reference other publications and consultations that we have published, where you will be able to find out more details on specific topics.

You will find that most figures in this document refer to the 2015-16 financial year. We report our performance to our economic regulator following the end of each year and this is the latest year for which we have published data.

We will be using the SDS as the basis for discussion at a number of stakeholder events so we have placed questions throughout the document on the topics that we would particularly like to hear your views on. We also welcome your views on any topic discussed in this document, in any of the associated publications or on any other subject that you think may be relevant to the long term development of energy in the North West.

[1] http://www.enwl.co.uk/about-us/regulatory-information/business-plan

Executive summary

We know that there will be many major changes over the next thirty years, driven by the move to a low carbon economy, the introduction of new technology and changes in customer expectations. We are beginning to update our long term plans, based on our knowledge of these developments and conversations with small groups of stakeholders, but we would like to test our views with a wider audience and find out what our stakeholders' priorities are.

We also know that much of the infrastructure that will carry energy in the North West for the next thirty years is already in place, but the way that it is managed and controlled and the way that services are procured will change dramatically over the coming years.

We will continue to:

- replace or refurbish assets before they deteriorate to such an extent that they might fail
- reinforce assets to ensure that there is sufficient capacity on the network to meet increased demand or movements in demand
- reinforce assets to ensure that there is sufficient capacity on the network to meet the needs of locally connected generators
- ensure that assets are resilient to storms, flooding and other hazards.

But there will be many changes driven by:

- the move towards a low carbon future, including:
  - electric vehicles
  - heat pumps
  - heat networks
- the increasing number of small generators connecting to our networks
- the increasing use of local storage
- the development of smart grids
- the move to a Distribution System Operator (DSO) model
- the development of major infrastructure projects in our area such as the Northern Powerhouse and High Speed Rail
- the increasing reliance on electricity for all aspects of everyday life.

The extent to which demand in our area will grow will be driven by some of the factors listed above and also by the general economic growth of the North West. One scenario is that electricity consumption nationally will have doubled by 2050, so we will have to develop our network to ensure that we can deliver that demand efficiently and reliably.

The flooding events in Lancaster and Cumbria in December 2015 gave a clear illustration of the importance of a reliable electricity supply to society as a whole. A city of over 60,000 customers was disconnected from the electricity grid due to flooding. This had a dramatic, and sometimes unexpected, impact on all kinds of services in the city.

The Royal Academy of Engineering, working with the Institution of Engineering and Technology and Lancaster University, published a very useful report into the event called "Living without electricity - One city's experience of coping with loss of power"[2]. The report explores how the different services upon which we rely were affected by the loss of power, emphasises how much as a society we have become reliant on an electricity supply that is 'always there' and the challenges that arise when that power is not available at the flick of a switch.

We often characterise our role as 'keeping the lights on' but the experience in Lancaster has emphasised how much wider our role is in keeping the essential services running that customers and society rely on. In the future we would like to take a more holistic view, looking at investing not just to minimise the whole-life costs of our assets, but to optimise the benefits for society as a whole.

We would also like to look at the way that we contribute to the wider community. We know that we can help to combat fuel poverty by reducing costs and making energy more affordable, but we would also like to look at other measures such as energy efficiency and affordable warmth.

We hope that you find this document interesting and look forward to hearing your views on the future of our network.

Paul Bircham
Commercial Strategy & Support Director

[2] Available at http://www.raeng.org.uk/publications/reports/living-without-electricity

About Electricity North West Limited

In this section we explain a little about Electricity North West and our role in the industry, together with an introduction to the regulatory framework that we work in and the way that we aim to work in a sustainable, responsible manner.

About us

Electricity North West Limited is the electricity Distribution Network Operator (DNO) for the North West of England. There are fourteen regional DNOs operating in Great Britain, owned by six companies, who are responsible for transporting electricity from the National Grid and small generators through their networks to customers' premises.

We don't buy or sell electricity – that is the role of the electricity supply companies. They bill their customers and pay us for using our network. For domestic customers this typically makes up around 15% of the total bill or about £84 for an average domestic customer.

We don't install, operate or read electricity meters. That is also the responsibility of the supply companies, so they will be rolling out Smart Meters to the North West. We do still own a small number of 'legacy' meters, but in the majority of cases our network ends just before the customers' meter.

We don't own any generation, other than the small generators used to provide electricity to customers whilst a fault is being repaired.

We do own the overhead lines, underground cables and items of plant such as switchgear and transformers, which are used to distribute electricity to customers' premises in the North West of England.

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).

Through this network we deliver almost 24 terawatt hours of electricity each year to around 2.4million customer 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.

Our regulatory framework

Our main regulator is Ofgem, the Office of Gas and Electricity Markets, but as a large infrastructure company we have to comply with the relevant standards and regulations set by the Health and Safety Executive (HSE), the Department for Business, Energy and Industrial Strategy (BEIS), the Department for Environment, Food & Rural Affairs (Defra) and other government departments.

As we are a local monopoly the revenue that we receive from suppliers is regulated and is agreed at periodic price control reviews. At the price review we must submit our investment plans to Ofgem, setting out what we plan to deliver, how much we plan to spend and the benefits that will bring to customers.

The regulator compares our plans to those of the 13 other DNOs and with comparators from other industries to decide how much revenue we should be allowed to collect in return for the commitments we have made.

The current price review period is known as RIIO-ED1:

- **RIIO** is the acronym for the type of regulation, where **R**evenue is linked to the **I**nnovations and **I**ncentives which deliver **O**utputs for customers; and
- **ED1** simply refers to the first price review for **E**lectricity **D**istribution under the RIIO framework.

RIIO-ED1 runs for eight years from April 2015 to March 2023. The following price control review period, which is expected to run from April 2023 to March 2031, will be known as RIIO-ED2.

The price control mechanism allows us to collect a 'base revenue' which is set at the start of the period, but we have incentive mechanisms where we are rewarded for good performance, and penalised for poor performance.

We also have funding schemes to deliver specific activities such as undergrounding overhead lines in areas of outstanding natural beauty and improving supplies to worst served customers. In addition, we participate in schemes designed to fund research into innovative solutions which will improve the way that we distribute electricity.

Sustainability

Providing a sustainable network is the key to meeting our long term obligations. To do this, we need to ensure that we include social and environmental considerations in all our operations; satisfying our customers' demands whilst also managing the expectations of other people such as employees, suppliers and the communities around us.

We are committed to being responsible stewards of the natural resources we develop and use in our operations and seek to minimise our environmental impact.

We are also conscious of the role we play in the North West and the need to play a part of the communities in which we operate, seeking to foster meaningful, long-term relationships that respect local cultures and create lasting benefits.

Stakeholders

We are continuing to develop our programme of stakeholder engagement, interacting with a broad range of stakeholders through our advisory panels on 'reliability', 'sustainability' 'affordability' and 'vulnerability'. These panels meet twice a year to review action plans and all come together once a year at our 'strategic advisory panel' for a full day planning session.

Corporate Social Responsibility (CSR)

Our Corporate Social Responsibility (CSR) strategy has been developed by engaging with our stakeholders to determine what is important to them, assessing the business strengths and future direction, and also looking at the community issues faced in the North West.

We are committed to being a responsible and sustainable business and our activities therefore adhere to the following CSR responsibilities:

- *Economic* – Be a profitable and successful business
- *Regulatory* – Abide by current legislation
- *Ethical* – Operate in an open, honest and innovate manner to deliver and improve how we do things
- *Philanthropic* – Operate in a sustainable and responsible manner that meets the needs of the communities in the North West.

Outputs

Outputs were introduced as part of the RIIO framework and are the products and services we will deliver for our customers and stakeholders, in return for our 'allowed revenue'. Ofgem specified six Outputs areas and asked for our proposals for each. They define the Outputs as:

- **Reliability and availability: providing long-term reliability of supply, minimising the number and duration of interruptions and ensuring adaptation to climate change.**
- **Environment: reducing carbon emissions and the environmental impact of the companies' activities by managing carbon footprint, visual amenity and pollution.**
- **Connections: connecting customers in a timely and efficient way, and enabling competition.**
- **Customer satisfaction: maintaining high levels of customer satisfaction and improving service.**
- **Social obligations: helping vulnerable customers.**
- **Safety: providing a safe network in compliance with Health and Safety Executive (HSE) safety standards.**

In this chapter we will look at each of these Output areas and the factors that will influence our plans for the future.

Q1. Do you think that the six Output categories are valid going forward into the next price review period?

Q2. Are there any additional categories needed to reflect stakeholders' needs?

Business Plan Commitments

For RIIO-ED1 we went beyond the basic Outputs defined by Ofgem and made forty commitments which will address specific issues in each of the six areas over the eight year period.

More detail on these commitments and our performance against them in 2015-16 can be found in our Business Plan Commitments report[3]. We will publish a similar report on our progress by 31 October each year.

We have not duplicated the list of commitments in this document, but we would also welcome any views you have on the contents of the Business Plan Commitments report.

Safety

As a company we are dedicated to achieving the highest standards of health and safety for all our customers, employees and contractors. Our aim is to minimise the risk of unwanted events occurring through a mix of education, awareness, training and investment in the network where appropriate.

In the long term we will continue to work to a 'zero harm' health and safety strategy, delivering compliance with all applicable legislation as the primary output measure.

Our RIIO-ED1 commitments on safety relate to specific initiatives on substation security, safe climbing and asbestos management. It is taken for granted that we will continue to comply with all regulatory and legislative requirements.

Q3. In RIIO-ED2 we will continue to target compliance with all health and safety regulations, but are there any additional areas where you think we should be doing more?

Q4. Stakeholders have previously told us that we should do more to promote safety awareness to young people. How should we best undertake this?

Reliability and availability

Stakeholders have consistently told us that they want us to deliver a reliable, affordable and sustainable network, so we have to balance the requirement to satisfy customers' current needs with the need to develop the network for the future, whilst trying to ensure that energy costs are affordable.

We know that delivering an affordable, reliable network is the best way to improve customer satisfaction and customer wellbeing, but it also helps to increase confidence in the North West as a place for companies to invest, so will improve the economic prospects for the area through increased employment and wealth creation.

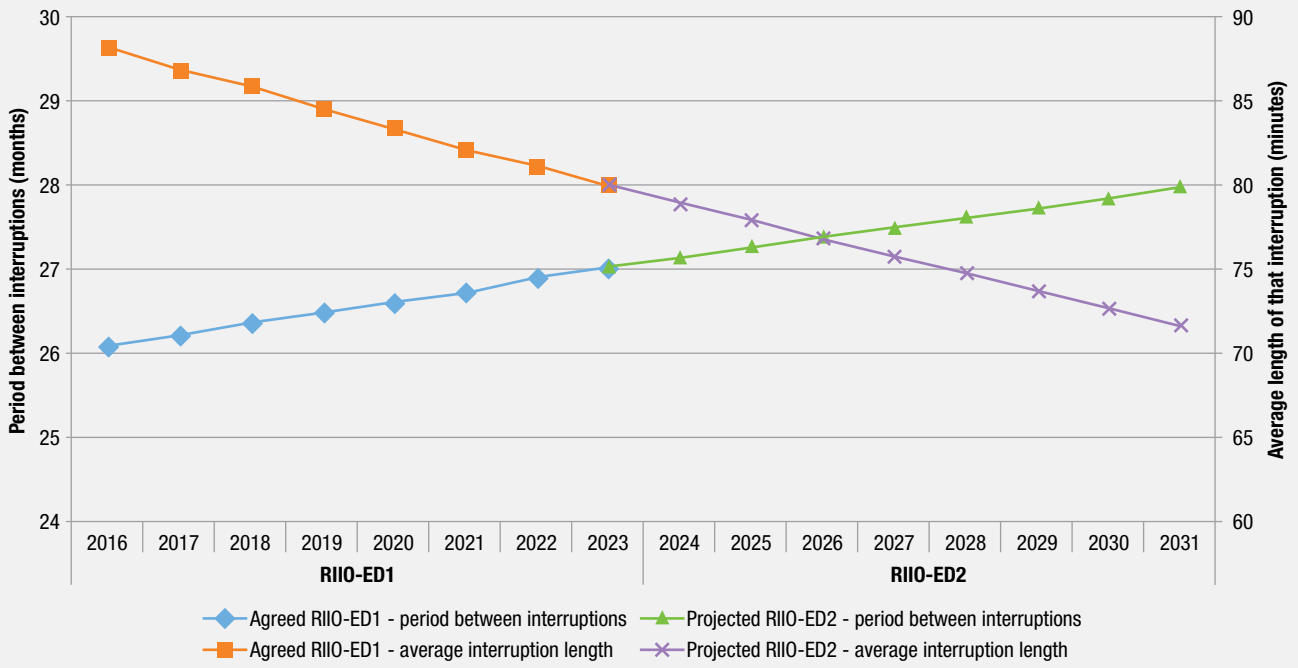
The main performance measure that we have for reliability and availability are the number and length of customer interruptions, which we are incentivised to improve through targets agreed at each price review.

If we meet our current targets the average customer would expect to have an unplanned interruption once every 26 months and that interruption would last just under 90 minutes. This is in contrast to our targets from 10 years ago, when we aimed to have an interruption of less than 105 minutes every 21 months. We have consistently met and exceeded these targets.

If we meet our targets for the RIIO-ED1 period, by 2023 the average customer would have an unplanned interruption once every 27 months and that interruption would be for 80 minutes.

[3] http://www.enwl.co.uk/docs/default-source/investors/business-plan-commitment-report-2016.pdf

Targets for frequency and duration of unplanned interruptions



Q5. If we continue with the current rate of improvement in reliability and availability, by 2031 unplanned interruptions will be an average of 28 months apart and last just over 70 minutes. Do you think this level of reliability is acceptable?

Q6. The interruptions incentive scheme only covers interruptions that last more than three minutes. Do you think we should be incentivised to improve our performance on shorter interruptions?

The introduction of incentives on reliability and availability has driven up the average level of service that customers receive. We know that in a typical year around 75% of our customers will not be interrupted at all and around 22% will be interrupted once or twice.

For the remaining 3% of customers the frequency of interruptions can become a disruption to their lives. We would like to improve the service to these customers.

Ofgem currently define Worst Served Customers as:

"Customers experiencing 12 or more higher voltage unplanned Interruptions over a three year period, with a minimum of three higher voltage unplanned Interruptions in each year"

Using this measure at 31 March 2016 we had 1,523 worst served customers, and our RIIO-ED1 Business Plan Commitment is that we will have no worst served customers by 2023

Q7. Do you think that the plan to have no Worst Served Customers by 2023 is sufficiently ambitious?

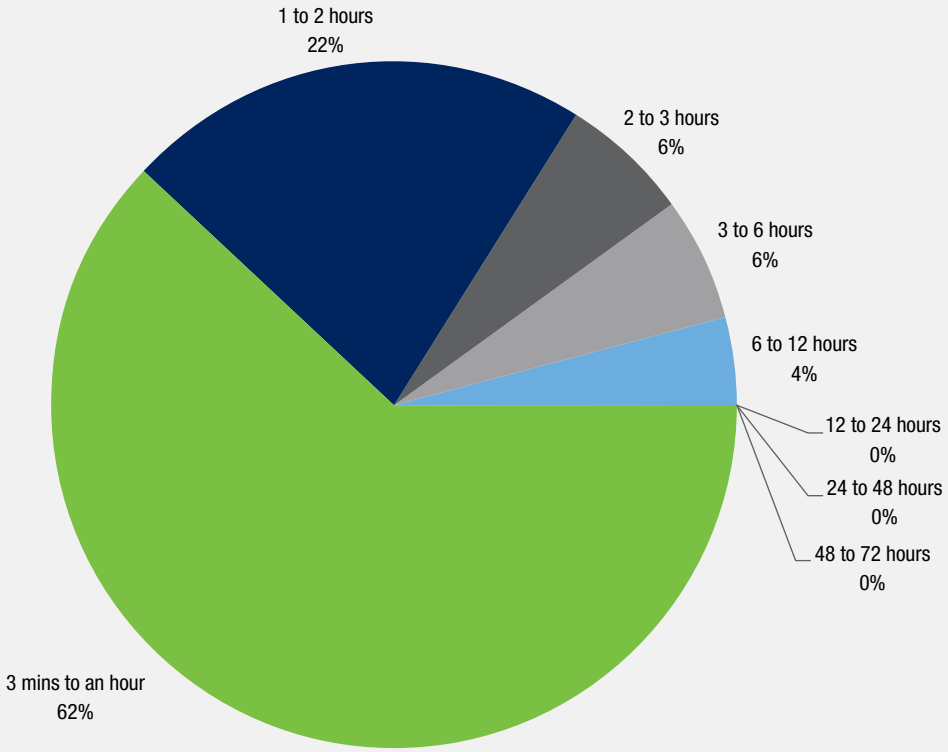
Q8. How should we identify 'worst served' customers in the future and what level of redress should we offer to these customers??

The Ofgem definition excludes faults on LV circuits from the Worst Served Customers measure. As part of our preparation for the next price review we will be assessing the practicalities of including LV faults as part of this incentive scheme.

Q9. Do you think that LV faults should be added to the Worst Served Customer definition in the future?

The chart below illustrates the length of time that customers were off supply due to each unplanned interruption in 2015-16. These figures do not include the interruptions of less than 3 minutes and those caused by severe weather events.

Length of unplanned interruptions in normal weather conditions - 2015-16



It can be seen that 90% of these interruptions were less than three hours, and 99.9% were less than 12 hours, but a very small number of customers had a level of service that was far worse than this, with a total of 126 interruptions of more than a day and one customer off supply for more than two days.

Under the Guaranteed Standards scheme, customers interrupted for more than 12 hours in normal weather conditions receive a payment of £75 plus a further £35 for every additional 12 hours, so in 2015-16 just over one thousand customers were eligible for this payment.

Q10. We believe that customers will be increasingly intolerant of longer interruptions. What length of interruption do you think should trigger a payment in the future and what should that payment be?

Providing a reliable network

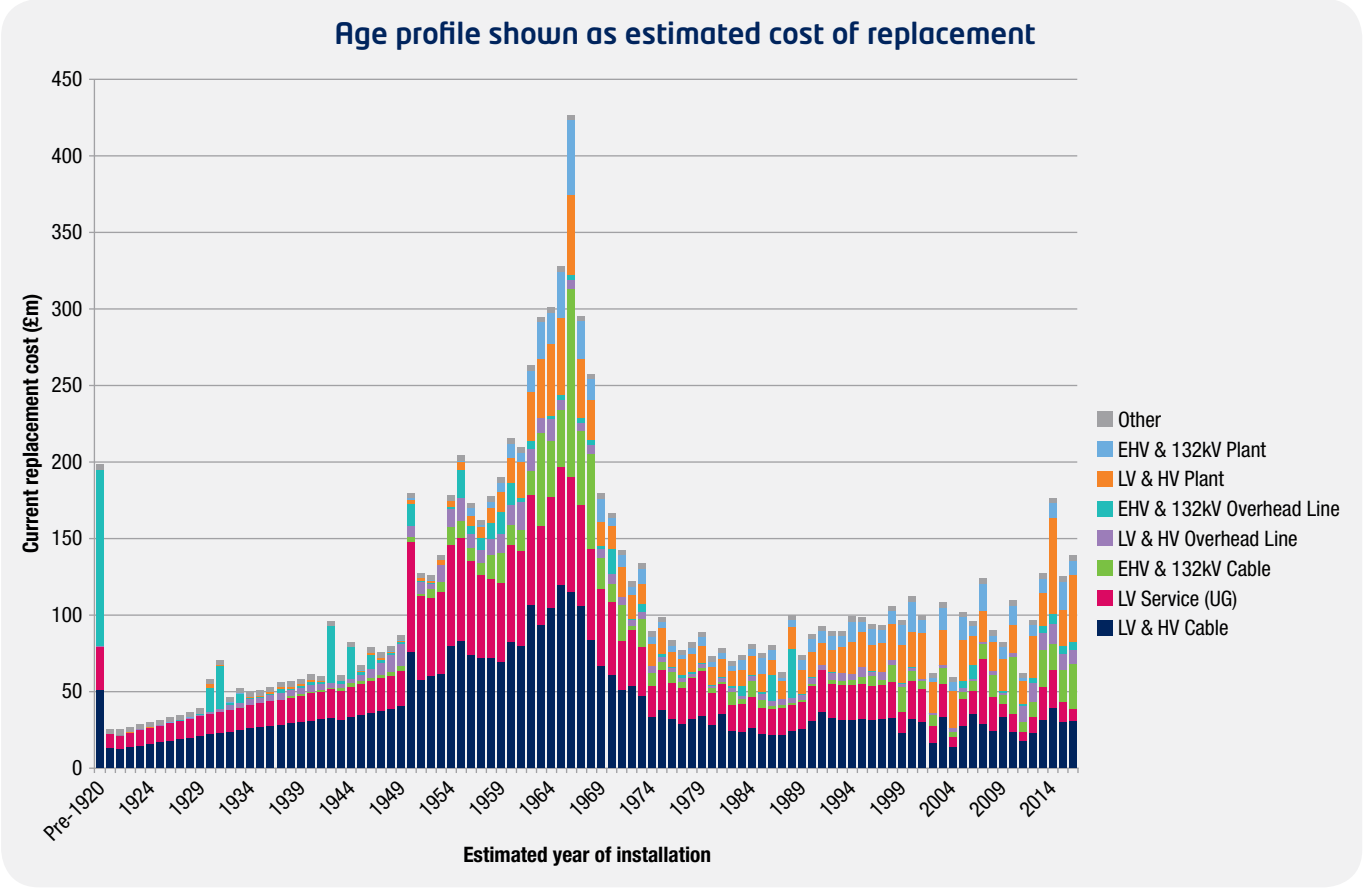
The three main tools to ensure that our network is reliable and sustainable are:

- Asset renewal;
- Reinforcement; and
- Improving resilience.

We discuss each of these in more detail in the remainder of this section

Asset Renewal

The chart below is illustrates the age of our network, displaying the estimated cost of replacement of all the assets by the year of installation.



The chart illustrates a number of points:

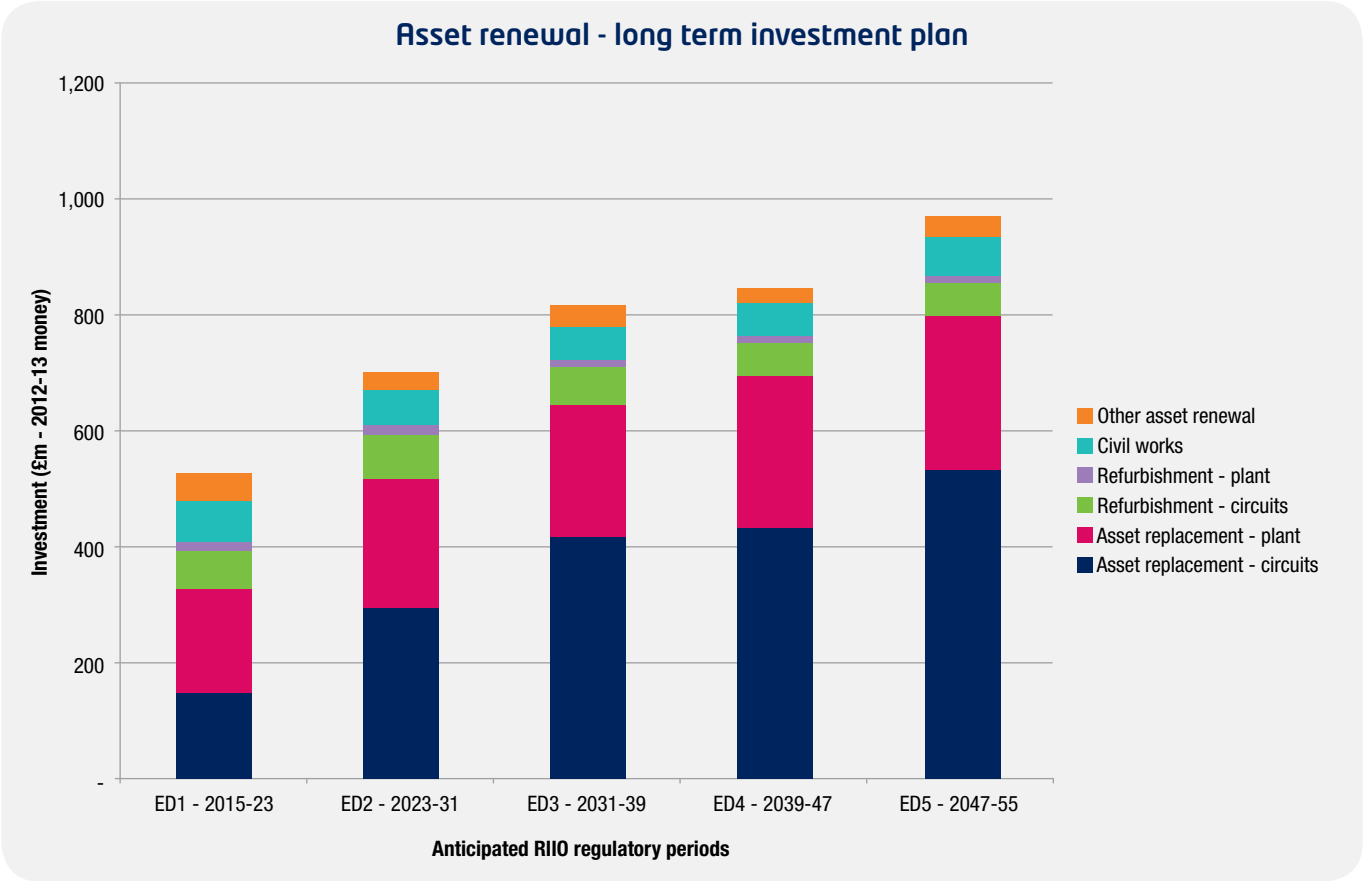
- We have an ageing asset base with some of our assets over a hundred years old,
- A large amount of construction of the network took place in the 1950s and 1960s, which means that a large proportion of our assets are now fifty to sixty years old;
- By replacement value, over half our asset base is underground

In managing our current asset base, our aim in most cases is to replace the assets before they fail to avoid the consequential interruptions to customers. If we were to use traditional methods and replace assets when they reached a specific age, we would expect to see a very large investment programme over the next twenty years to replace those assets installed in the 1950s and 1960s.

We prefer to take a risk-based approach, where we inspect the condition of the assets to estimate the probability of failure and we also assess the consequence of that asset failing. We are then able to prioritise investment on those assets which are most likely to fail and will have the biggest impact on customers.

We will then decide whether these assets need to be replaced or whether there is an appropriate refurbishment technique which can extend the life of the asset.

Using this approach our current long term view of asset renewal investment is set out below.



It can be seen that we expect significant growth, largely resulting from the need to replace aging assets. The major growth is driven by the predicted need to replace underground cables, particularly at the lower voltages.

We have recently been working with the other DNOs to develop a common way of assessing the asset risk on our network through the Common Network Asset Indices Methodology (CNAIM)[4]. In the future we will be using this approach to develop our plans and we will update you in further issues of this document.

Q11. If we were to deliver the growing investment programme set out above, there would need to be an equivalent rise in tariffs. Do you think this would be acceptable to manage the levels of risk on the network?

Reinforcement

We need to ensure that our network has sufficient capacity to cope where demand in a particular area has grown or where new load is connected to the network. Traditionally this reinforcement has involved replacing existing equipment with larger versions of the same kit or adding new assets to the network to give greater capacity.

We do not believe that continually adding assets to our network is a sustainable way to cope with increasing demand, so through our innovation projects we have been looking at innovative ways to avoid the need for physical reinforcement.

[4] https://www.ofgem.gov.uk/system/files/docs/2017/05/dno_common_network_asset_indices_methodology_v1.1.pdf

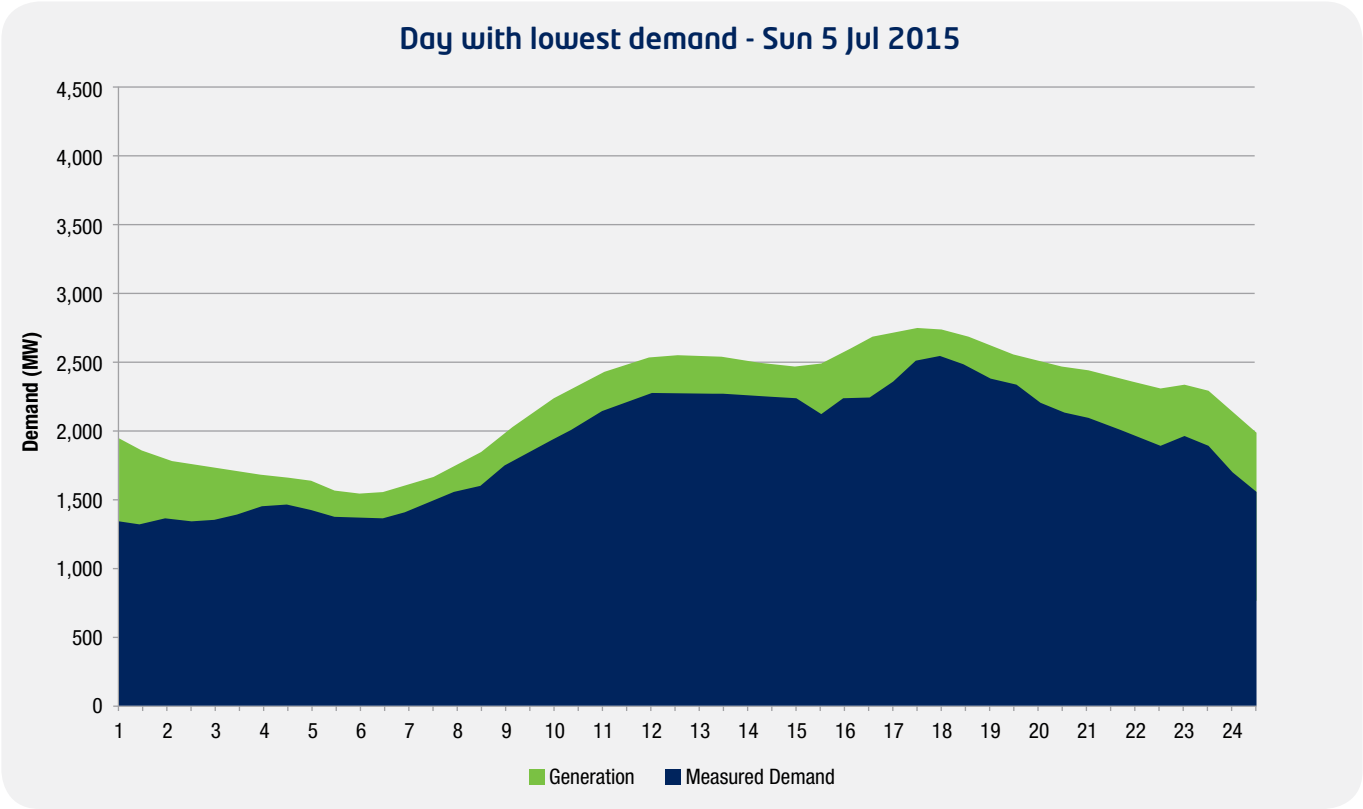
We expect the major drivers for changes to the load on our network to be:

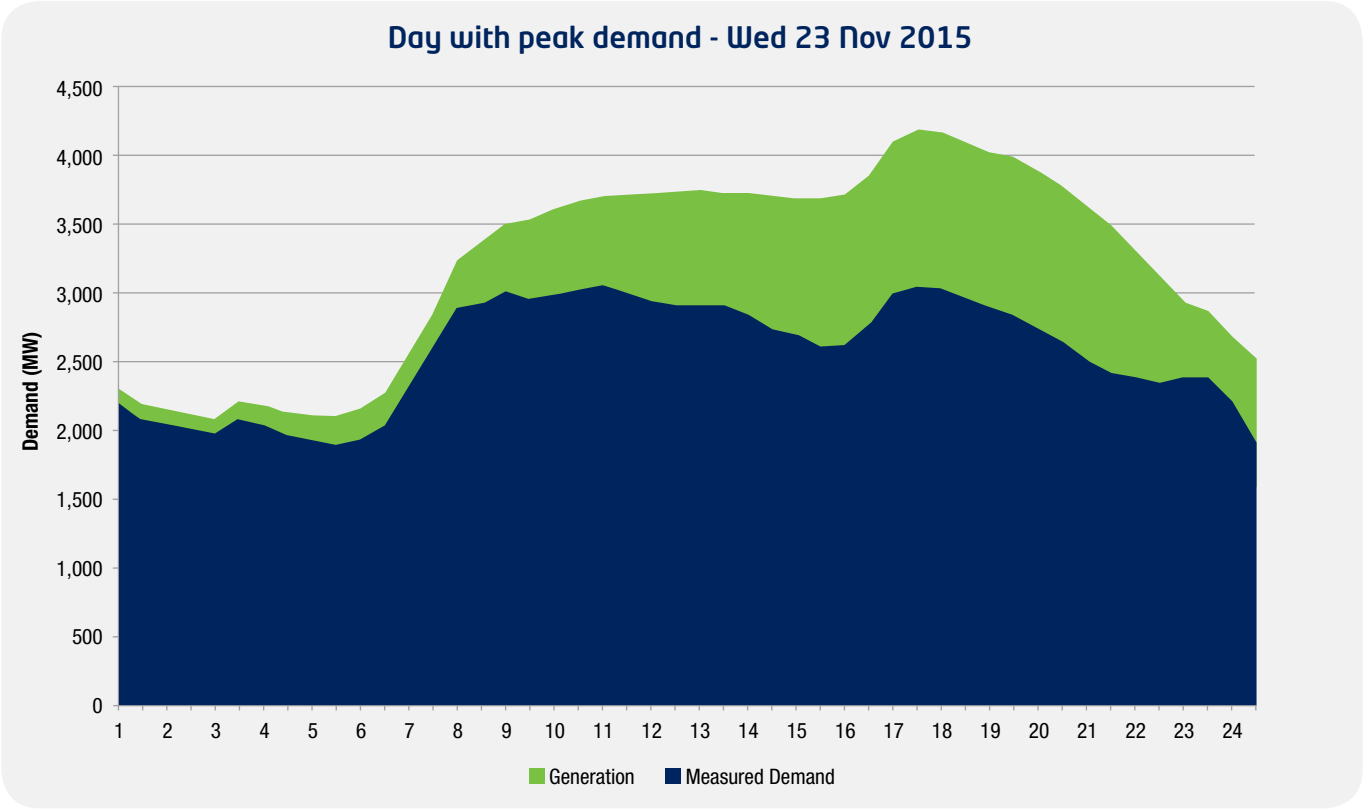
- **De-carbonising transport:** The growth in the number of electric vehicles in our area will be a major driver of increased load. It is estimated that the electricity required to drive 80 miles is equivalent to the daily consumption of an average house. We will need to reinforce the network to cope with the increased demand, but we will also need to make sure that the refuelling load is managed 'smartly' so that it is spread across the day in an optimal manner.
- **De-carbonising heat:** In the long-term, heat pumps are expected to replace gas heating as the main source of domestic heating. Although heat pumps are an efficient means of providing heat, they require a significant electrical input, which will again increase demand on our network.
- **Population growth:** A growing population will require more electricity so we carefully monitor forecasts for movements in population in our area. It is not just the overall level that we look at, but also how the population is moving within in our area, causing some parts of the network to become overloaded whilst others have surplus capacity.
- **Economic growth:** Whilst less than 10% of our customers are commercial and industrial, they account for around two-thirds of the demand on our network. Consequently our network requirements are closely tied to the economic wellbeing of the North West. Initiatives such as the Northern Powerhouse and High Speed Rail are expected to have a major impact on the long term economic growth of our area.
- **Energy efficiency:** The factors above are all expected to increase the demand for electricity, but this will be mitigated by increasingly efficient ways of using electricity.
- **Distributed generation:** Connection of Distributed Generation directly to our network may reduce the need for reinforcement in some areas, but in areas with a high amount of generation connected we may need to reinforce for generation needs rather than demand.
- **Smart solutions:** The application of innovative techniques will enable us to manage the changes in demand better and may also enable us to suppress growth in demand.

The extent to which these differing drivers materialise will influence not just the overall level of demand, but also the profile of that demand across the day and across the year.

Demand for electricity has historically always been higher in winter than in summer, but we are seeing changes in the pattern of demand where this situation is starting to reverse.

The two charts below illustrate the difference in total demand between the day with the minimum demand in the year 2015-16 and the day with the peak demand. The charts also illustrate how much of that demand is supplied from embedded generation connected to our network. The blue area shows the amount of electricity entering our network from National Grid and the green area shows the local generation, which comes primarily from wind turbines and Combined Heat and Power (CHP) plants, but also from photo-voltaic solar panels (PV) and technologies such as sewage gas generation.

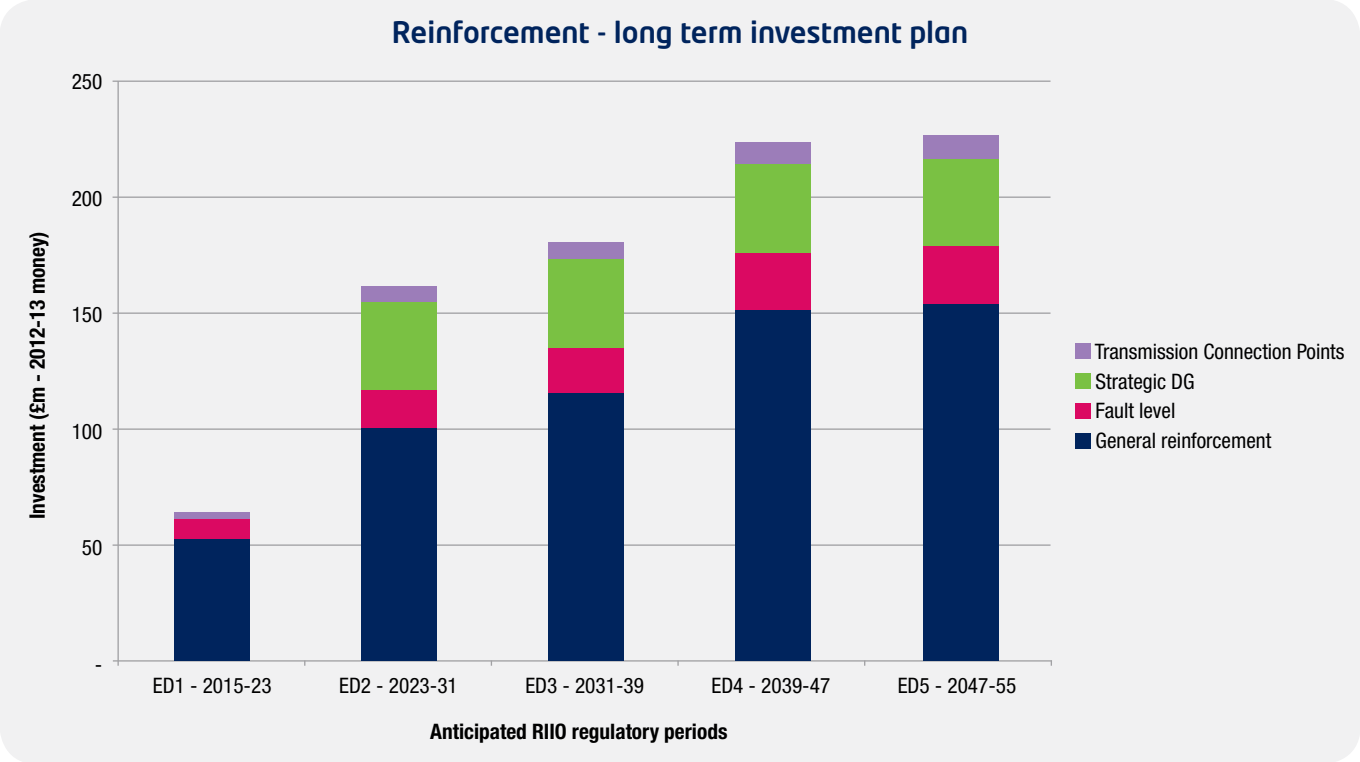




In the future we expect to see a smaller differential between the summer and winter profiles as the demands on our network change, particularly the demand for air conditioning load in the summer months.

The chart below shows our current long term forecast for investment in reinforcement. As well as the general reinforcement required to meet load growth we also reinforce to ensure our equipment is able to safely withstand high levels of fault current (Fault Level) and to provide capacity to make it easier for generators to connect to our network. Our forecast expects growth, but the level of that growth will be driven by the variable factors listed above.

The way that we forecast the needs of our growing network are evolving, so we expect to refine the forecasts below, which we will report on in future versions of the SDS.



Resilience

To maintain a high level of availability on our network, we must ensure that it is resilient to the hazards that are faced every day. For example we have 13,000km of overhead line on our network, which needs to be able to withstand the impacts of lightning, storms, other severe weather and man-made risks such as theft and vandalism.

The specific areas where we have programmes of work to improve levels of resilience are:

- **Black start** is the process of re-energising the network following the complete loss of power to an entire region. We fulfil our requirements in this process by ensuring that our major substations have enough backup battery capacity to be able to be switched back on.
- **Critical National Infrastructure (CNI)** – CNI sites are deemed to be those most critical to the national interest. No sites were identified as needing work during the RIIO-ED1 price control negotiations, however two locations have subsequently been identified and we continue to work with the government to deliver appropriate plans.
- **Site security/theft** – as global metal prices rose we saw an increase in the incidence of metal thefts from our assets. We are currently upgrading security at our major substations to improve continuity of supply.
- **Pinch points** are parts of our network where multiple circuits come together on a structure so that a single incident could lead to a significant number of customers losing supply. We are re-configuring the network in these areas to ensure that this doesn't happen.
- **ETR132** is a national document setting out a risk-based approach to vegetation management near overhead lines to improve network resilience during abnormal weather. By complying with this approach we will reduce the number of interruptions during storms.
- **Flooding** – the potential damage that flooding can cause to our substations, with the consequential interruptions to supply, means that protection against the impact of floods is our major area for investment to provide resilience and we discuss it further below.

Whilst we have some discretion over the areas of investment that we make to ensure the network continues to operate in 'normal' conditions, investment in resilience is largely mandatory in order to meet legal requirements so we are not asking for stakeholder endorsement of our plans in this area. The one exception to this is flooding where we have some discretion on our levels of spending.

Flooding

Our resilience plans were tested fully in December 2015 when Storms Desmond and Eva caused severe flooding in the North of England. Over the previous five years we had been implementing a programme of flood protection at our major substations in line with an agreed national standard. This was sufficient to protect most substations, but the flooding at Lancaster and Rochdale exceeded all expectations causing loss of supply to a large number of customers.

Consequently we have been reviewing our flooding plans to ensure that substations are protected against the higher levels of flooding which may arise with a changing climate.

We currently aim to protect all our 132kV and EHV substations against a once in 100 year flooding risk by 2020, but we will be increasing the level of protection at some substations in line with the recommendations of the government's National Flood Resilience Review[5]. This suggests that substations serving more than 10,000 customers should be protected against a once in a 1,000 year flooding risk.

We currently have 53 substations serving more than 10,000 customers of which 15 do not meet the required standard. We are identifying the appropriate solutions for these sites and intend to have this programme of work completed by 2030.

We will also be looking at ways of improving flood protection at HV substations and at the service position in customer premises.

Q12. What areas should we look at to best prepare for the impact of flooding events?

Social Obligations

As a responsible business operating in the North West of England, we are keen to play our part in contributing to the health and well-being of the local population.

Events at Lancaster highlighted the reliance of the wider community on a reliable energy network, but we are also very aware of the contribution that we can make to the health of people in our area.

The link between warmth, comfort and health is well established and we want to look at ways of providing affordable warmth to customers, which will in turn help to reduce illness and the demands on the National Health Service.

Currently the primary way of achieving this is through the efficient management of our investment plans resulting in more affordable electricity costs to customers, helping to reduce the risk of fuel poverty. In the future we would like to work in other areas to improve the provision of affordable warmth, such as energy efficiency.

In the current structure of the electricity industry it is the electricity suppliers who are incentivised to promote energy efficiency, but through our Power Saver challenge project we worked with a local community to promote energy efficiency measures, which reduced their energy costs, but also allowed us to avoid the building of a costly new substation to cope with increasing demand.

We believe that as a company with a large regional presence, we are ideally placed to promote energy efficiency across the North West. This will bring two main benefits to customers: lower energy usage and lower electricity prices because we will avoid reinforcement costs. If customers are spending less on their energy bills then they will have fewer worries about keeping their homes warm, which will contribute to the improved health of the North West.

'Power Saver Plus' is our 2017 bid for innovation funding through the Network Innovation Competition. The project will trial new approaches to delivering energy efficiency with domestic customers, community energy groups and small businesses connected to the low voltage network. If successful, it will demonstrate how a DNO-led, targeted energy efficiency programme can reduce the need for costly and disruptive network reinforcement, lower the costs of meeting the power needs of electric vehicles, heat pumps and other technology on local networks, and reduce the overall costs of decarbonisation while lowering the national carbon footprint of electricity generation.

Q13. Do you support our view that DNOs are ideally placed to deliver energy efficiency schemes in their geographical areas rather than the current model of giving responsibility to electricity suppliers?

We will continue to provide enhanced services to vulnerable and priority customers when they are without power. To facilitate this we are actively promoting our Priority Service Register (PSR) so we know where our vulnerable customers are. These could be elderly, disabled, families with young children or customers who have recently had operations. If we know their specific need we can provide additional support during times when their power is off.

More information on our Priority Service Register is available on our website[6].

As part of our Well Justified Business Plan we made a commitment to improve network reliability for 56 hospitals and at 87 distribution substations where we identified a high concentration of vulnerable customers, particularly areas with nursing homes and sheltered housing. Previously we have given all customers equal preference when making network investment decisions, so this is the first example of a differential service.

Q14. Do you think that we should make further investment decisions based on the type of customers on the network or should we continue to provide a 'universal' service to customers?

[5] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/551137/national-flood-resilience-review.pdf

[6] http://www.enwl.co.uk/priority

The increasing importance of a reliable energy network has prompted us to look at the way we value the benefits arising from our investments. Previously we have prioritised expenditure based on the lowest whole-life costs to ourselves and hence customers in the form of bills. We would like to extend our evaluation processes to reflect how spending can be prioritised for the overall public benefit.

As part of our RIIO-ED1 price review submission we used Cost Benefit Analysis (CBA) techniques which had been agreed with the regulator. These techniques took into account the cost of carbon and the impact of losses, although these are not direct costs to ourselves. We will be working to develop proposals to take to Ofgem on how societal impact can be valued in a similar way in our investment decisions.

Q15. Do you agree that societal benefits should be considered when evaluating the benefits of projects?

Q16. Have you any views on how societal benefits should be valued in our investment appraisals?

For most of our investment programme we will use some form of risk-based assessment of the costs and benefits to identify the priority areas and to identify the best solutions. The crucial question in these assessments is what level of risk should we be willing to accept and how should this vary between day-to-day risks and the risks of extreme events.

Q17. Who should decide what level of risk we should take and what to pay to achieve that level of risk? Should it be the responsibility of the regulator or individual companies to decide the appropriate level of risk?

Customer satisfaction

The primary driver of customer satisfaction is a reliable network. As we have noted previously we have a very reliable network, with an availability of 99.99%, which keeps most of our customers happy. However when customers do have an interruption, they want to be able to contact our call centre quickly and receive a professional response.

Our price control incentivises DNOs to improve performance in this area through the Broad Measure of Customer Service. This is a composite measure combining a customer satisfaction survey, a complaints metric and a stakeholder engagement score.

Our performance against these measures has not been where we would like it to be and we are committed to improving our service to customers.

Customers tell us that the most important thing in their contacts with us is to have accurate information, especially a good estimate of the time of restoration for a fault or for a planned interruption and we are working to improve our performance in providing accurate information.

Q18. What have been your experiences when you have contacted Electricity North West?

Q19. What areas would you like to see improved?

Q20. What forms of customer service have you seen elsewhere that would be useful for us to learn from?

Connections

Connecting customers efficiently and economically is an important part of our business and a crucial service for our customers. It is a service that facilitates economic growth and allows us to support delivery of our stakeholder priorities.

There are three main sources of new connections to our network:

- New demand connections – such as supplies to a newly built house, housing development or commercial premise
- Distributed generation connections – such as wind farms, Combined Heat and Power (CHP) plants and large scale solar installations
- Unmetered connections – such as local authority street lights.

This is an area that is open to competition and we are keen to make sure that customers in the North West benefit from competition. More information on how to connect to our network can be found on our website[7].

Engagement with stakeholders is a key focus of our connections business and also of our regulator. As part of the RIIO-ED1 framework Ofgem introduced the Incentive on Connections Engagement (ICE) which is designed to ensure that DNOs engage with those customers 'seeking larger and more complex connections' to ensure that they understand their requirements. If DNOs fail to engage effectively with these customers they could be subject to a penalty of up to 0.9% of their base revenue.

Once we fully understand the needs of our connections customers and stakeholders, we can then prioritise our actions, in order to continue to improve the service we provide.

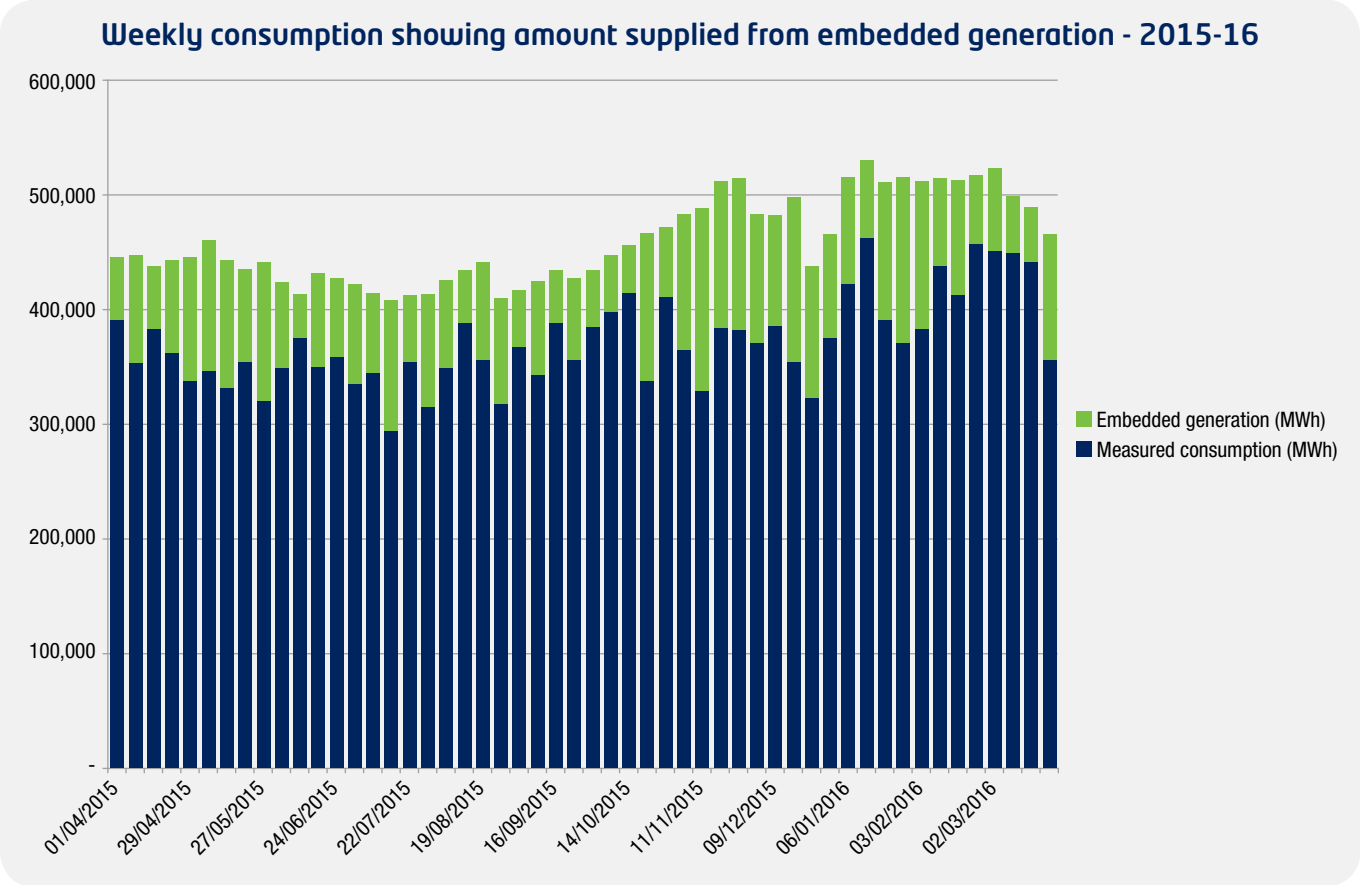
Because this is a major customer interface we have a dedicated stakeholder engagement process for this area, with its own website[8] containing details of the workshops we have held, the forward looking work plan and our annual reports. Any comments on our long term plans for connections should be fed in through that process.

[7] http://www.enwl.co.uk/our-services/connection-services

[8] http://www.enwl.co.uk/our-services/connection-services/incentive-on-connections-engagement

Distributed generation

Distributed or embedded generation is becoming increasingly important on our network. The chart below shows the total weekly consumption in 2015-16 and the portion of that which was provided by embedded generation.



In total for 2015-16, around 19% of the electricity consumed in our area was generated locally.

The chart clearly shows the seasonal variation in electricity usage, with the greater demand over the winter months. The week with the lowest consumption is in mid-July with around three quarters of the usage of the week with the highest consumption in mid-January.

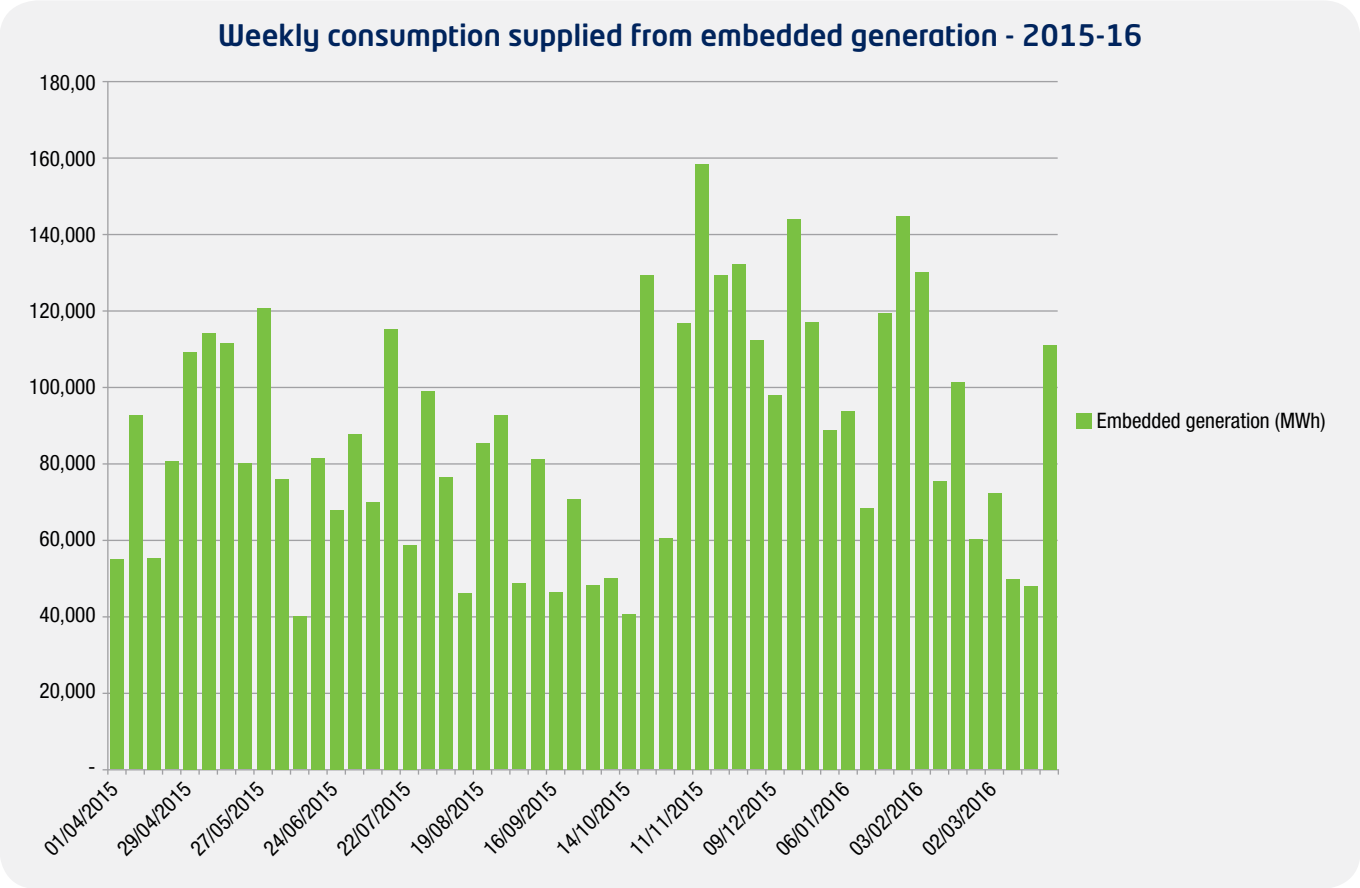
We expect that the amount of embedded generation will continue to grow and we are planning for a number of scenarios, which will largely be driven by government policy.

Whereas the electricity infrastructure in the UK has been set up to be 'demand led', with generation scheduled to meet demand, in the future it will be 'generation led' which brings new technical issues to our network. We are investing in innovation projects to identify the best ways to meet these challenges.

Q21. What are your views on the balance between local generation and large scale national generation in the future?

Q22. With the increasing amount of local generation and self supply, is there a scenario where the majority of our customers are 'off-grid' and don't need to connect to our network?

Isolating the amount supplied from local generation in the chart below, it can be seen that there is no clear seasonal pattern for embedded generation.



This generation will be mainly sourced from CHP and wind, but there will also be input from photo-voltaic solar cells (PV), sewage gas generators, small hydro and other technologies.

Looking forward, the amount of generation connected to our network will largely be driven by economic factors, including government incentives. The recent rise in the amount of solar generation connected to our network was prompted by the attractiveness of the Feed-In-Tariff (FIT) combined with improvements in efficiency and reductions in cost in PV cells.

As a DNO we do not install commercial generation ourselves but we have to be in a position to respond efficiently when generators apply to connect to our network.

Environmental impact

We are dedicated to achieving the highest standards of environmental performance, not only by minimising the risk of adverse impacts such as pollution, but through investment in outputs that deliver a positive impact, such as undergrounding of overhead wires. We are determined to play our part in enabling the transition to a low carbon future.

This influences both our asset investment plans and our investment in measures to reduce our own carbon footprint. As part of our regulatory obligations, we publish an annual report on our environmental impact[9], detailing our progress against our environmental commitments. A brief summary of some of our activity is given below.

[9] http://www.enwl.co.uk/docs/default-source/about-us/environment-report-2015-16.pdf

Losses strategy

Electrical losses are an inevitable part of transporting electricity through a network, but if we can reduce the amount of electricity lost in our network this will reduce the amount of energy that needs to be generated, reducing costs to customers and reducing our carbon footprint.

Our strategy to reduce losses is published on our website[10]. We aim to achieve a significant improvement in losses performance through measures such as the introduction of low loss transformers and the installation of larger cross-section cables.

In addition to assessing the costs and benefits for ourselves associated with losses projects we also look at the wider benefits to customers due to lower energy bills and reduced carbon emissions.

Oil Insulated Cables

Some of our underground cables use oil as an insulating medium, but if leaks develop in the system the oil can escape into the surrounding area polluting the environment. We are undertaking a programme of replacing oil filled cable to reduce the potential for damage to the environment.

Due to the significant level of environmental risk, we plan to completely replace all our 447km of oil filled cable with a solid alternative by 2050 at a cost of over £208 million.

Q23. With the potential dangers from oil leaks from fluid filled cables, is removal of all risk by 2050 a reasonable target or should we be aiming to bring this forward?

Business Carbon Footprint

We continue to investigate means of managing our impact on the environment, particularly through energy efficiency measures in our buildings and improved management of emissions due to transport

We are currently committed to reducing our carbon footprint by 10% compared to our 2015 total by 2020, saving over 2,440 tonnes of CO2 emissions annually.

Q24. Measures such as the introduction of more efficient vehicles and the refurbishment of our buildings are part of our plans to reduce our carbon footprint by a further 10% by 2030. Do you think this is a sufficiently stretching target?

Undergrounding of overhead lines for visual amenity

We currently spend just over £1 million each year in National Parks and Areas of Outstanding Natural Beauty to replace overhead lines with underground cables in order to improve the 'visual amenity' of the area. The amount of overhead line removed will vary depending on the voltage and location of the project, but over the last six years we have removed an average of 10km each year.

In total we have 3,558km of overhead lines in National Parks and Areas of Outstanding Natural Beauty, so we work with our regional partners to identify the priority areas to work in. We propose to continue removing overhead lines at the current rate, so by 2050 we will have reduced the amount of overhead line in these areas by 10%.

Q25. Do you think that undergrounding 10km of overhead line per year for visual amenity is an appropriate amount to deliver?

Q26. Are there any other areas that you think we should be investing in as part of our environmental programme?

[10] http://www.enwl.co.uk/docs/default-source/default-document-library/electricity-north-west---losses-strategy---april-2015.pdf

Changing roles and markets

We have talked about our current role and markets, but these will be changing in the coming years. We will innovate to develop our current roles and responsibilities, but we are also looking at ways the structure of the energy distribution industry may change, such as the introduction of Distribution System Operators and the more widespread use of District Heating.

This chapter introduces some of these new roles.

Smart Grids and Innovation

Smart Grids is an umbrella term to describe the application of new technologies to distribution networks to facilitate the movement to a low carbon economy.

Distribution networks were designed to be 'passive' entities with electricity entering the network from the national grid at high voltages and flowing 'down' through the voltages to customers' premises. In normal operation no intervention is required from our engineers unless we have a fault or undertake routine maintenance or construction.

A number of initiatives mean that this will not be the case in the future. These include:

- Embedded generation – there are an increasing number of small generators connecting to distribution networks. Where they export electricity on to the network it will change the power flows on our network
- Inflexible generation – the national fleet of large scale generators is moving from a mix made up largely of nuclear, gas and coal to one that will be made up of nuclear and renewables. The current portfolio is relatively flexible so it is possible to run plants up and down to match demand. The future portfolio will be increasingly inflexible, so demand will have to be scheduled to match the generation available
- The de-carbonisation of heating and transport, through Heat Pumps and Electric Vehicles, will increase the demand for electricity significantly. Careful management of this added load on the network will be essential to ensure that our system is not overloaded at times of peak demand.
- The management of embedded generation and the scheduling of demand customers are activities that will require 'active' management of our network so we need to develop new ways of managing the network. Simply continuing to add new assets to the network is not sustainable in a scenario where we expect electricity demand to double by 2050.

Over the last four years we have invested £40m developing innovative solutions to these challenges. More information is available on the Innovation pages of our website[11].

In addition we engage with the other DNOs and innovation developers to identify solutions which can be adopted on our network. The application of these solutions will move our network from a 'passive' collection of cables, lines and plant into a Smart Grid.

Ofgem's innovation incentive scheme provides two streams of funding for research and development:

- the Network Innovation Allowance (NIA) is an agreed percentage of our income that we can spend on research into new ways of running the network. Electricity North West has the highest percentage allowance at 0.7%, demonstrating our commitment to innovation
- the Network Innovation Competition (NIC) is a competitive bid for funding for projects against other network companies. We have been very successful in bidding under this mechanism and its predecessor, the Low Carbon Network Fund, developing five major projects.

The five major projects that we have developed following the competitive bidding process are:

- **Capacity to Customers (C2C) -** Combines proven technology and new commercial contracts to release network capacity
- **CLASS -** Proves that electricity demand can be managed by controlling voltage offering a revolutionary way to balance the system.
- **Smart Street -** Combines innovative technology with existing assets to make networks and appliances perform more efficiently
- **RESPOND -** The first UK demonstration of an active fault level management solution that avoids traditional network reinforcement
- **Celsius -** A co-ordinated approach to managing the temperature of electrical assets in distribution substations to release additional capacity

Q27. Have you any suggestions for areas of innovation that you think we should be looking at or other potential developments we should be exploring?

[11] http://www.enwl.co.uk/about-us/the-future

Electricity storage

As we develop the de-carbonised energy system of the future storage will become increasingly important both at domestic level and at grid level.

An increasing number of battery technologies are becoming available in the domestic and commercial market, but initially Electric Vehicles (EVs) are expected to be the most common storage devices for customers. As more customers buy home generation systems such as Solar Photo Voltaic (PV) they will want to store the output or use the output in their cars. Where EVs and other storage devices will revolutionise the industry will be the ability to sell energy to others when the price is high.

This will change how we think about storage allowing a whole range of customers to generate, store and sell energy. Much of that will start with energy suppliers or internet based businesses, but more and more people are expected to invest in this new market, and storage will be the key.

At grid level the technical benefits of storage are very clear; it offers flexibility, capacity and eases many of the challenges posed by renewable generation. Whilst storage solutions are already being used to make the electricity system more stable, we still need to develop storage that can discharge for longer periods of time at a reasonable cost. This will make storage suitable and more accessible for a wider range of roles in the power markets.

From a commercial perspective there are two challenges which must be overcome. The first is the price of storage which is already falling. The second challenge are the regulatory and market changes needed to enable new business models based on local energy trading, storage and generation. We are working closely with colleagues in the Electricity Networks Association (ENA) to help solve these challenges.

Storage will provide customers with greater control and allows them to buy and sell electricity at different times without having to change their behaviour or alter their lifestyles.

Q28. What developments do you see in the evolution of local markets for storage?

Q29. Current regulations do not allow DNOs to own grid level battery storage. Do you think DNOs should be able to own and deploy batteries as an alternative to network reinforcement?

Demand Side Response (DSR)

One example of an innovative approach to avoiding reinforcement is Demand Side Response (DSR). Under DSR we will enter a commercial contract with a customer which, with their agreement, would allow us to switch them off or reduce their load when there is a fault on the network or other times of very high demand.

This will benefit the individual customer financially, but will also benefit customers as a whole by reducing costs for everyone.

At the moment the focus for DSR is in the commercial and industrial market, but the application of new technologies could mean the use of demand management in domestic situations. Where the timing of the use of appliances is not critical it could be possible to schedule them to run at times that support the network. For example freezers do not need to be switched on constantly to ensure that goods stay frozen, so if we could switch them on and off remotely, it would help flatten the peaks in demand, reducing reinforcement costs for all customers.

Q30. Do you think that domestic customers would be willing to allow their DNO to control when their appliances run?

Q31. What other commercial arrangements could you envisage to manage load?

Distribution System Operator (DSO)

A number of the initiatives associated with the advent of Smart Grids and the move to low carbon technologies will require commercial and technical arrangements to be put in place, offering services to customers, to National Grid and to other network users. The responsibility for managing these arrangements will lie with Distribution System Operators (DSO).

As with the meaning of Smart Grid, the interpretation of DSO and its duties and obligations is still open to debate and we are active in that debate. In January 2017 we published our views on "Delivering a smart, flexible energy system"[12] in response to the BEIS-Ofgem call for evidence on that topic. We would like your views on that document or the short summary below.

The role of System Operator is familiar for the GB electricity transmission networks. The three onshore networks are owned by Scottish & Southern Electricity Networks, Scottish Power Energy Networks and National Grid, but National Grid is the Transmission System Operator (TSO) for all three networks. As TSO National Grid is responsible for scheduling generation to meet demand, maintaining system frequency and procuring other ancillary services.

For distribution networks, DSOs will manage the increasing interactions between the transmission and distribution networks, and the active management of supply and demand on distribution networks.

We expect DSOs to deliver localised and regional balancing of capacity to ensure that the network is used in an optimal way. This type of balancing is different from that undertaken by the TSO but will assist the TSO in maintaining the overall system balance, whilst ensuring appropriate focus on local issues.

Going forward, we believe that DSOs will have an increased system, rather than network focus and responsibilities will include:

- provision of network access (capacity)
- forecasting load and generation
- development of connections
- network resilience
- assessment of losses
- making best use of existing assets and
- service provision.

We also see an increased role for DSOs in identifying the necessary local transmission capacity and for developing local distribution capacity ahead of need to deliver effective and efficient capacity provision.

In our view, the role of the DSO will focus on the effective and efficient provision and balancing of network capacity, taking account of potential impacts from:

- distributed generation
- electricity storage
- electric vehicles
- heat pumps and
- Demand Side Response (DSR).

We envisage DSOs focussing on localised and regional balancing of capacity to ensure that the users of the networks are doing so in a way that optimises but does not unduly stress the assets and identifying where additional capacity is required to be released to meet users' requirements.

The focus for DSOs will therefore be on the technical constraints of the network, using thermal and voltage limits, for example, as key indicators of the level of balance achieved. Appropriate structures and governance should mean that these emerging actions by the DSOs assist the TSO in maintaining the overall system balance, whilst ensuring appropriate local focus.

The DSO will be responsible for purchasing services to achieve its own objectives but also selling commercial services to both customers and the TSO.

Whilst there are a range of potential models that could be used to establish DSOs, aligning DSOs with the regional DNOs seems the most logical to us in the first instance. This approach would enable regulators to apply comparative efficiency regulation to the commercial balancing of networks and thereby ensure that the approaches adopted are in the best interests of customers.

We believe that DSOs, as regulated entities, will need to have increased commercial flexibility to act in the interests of customers but should also be exposed to comparative efficiency tests to ensure that their decision making remains aligned with these interests.

In order for the UK to achieve its renewable energy and LCT ambitions, we foresee DSOs managing investment ahead of need within an agreed regulatory framework. This is an important strategic issue and we see joint TSO and DSO work being key to ensuring efficiency for customers.

Q32. Do you agree with our view of how a DSO will operate? Are there any more responsibilities the DSO should own?

Q33. For transmission there is licence separation between the system operator and the network owner. Do you think that model would be appropriate for distribution companies?

[12] http://www.enwl.co.uk/docs/default-source/about-us/enwl-dso-vision-jan-2017-(2).pdf

District heating networks

As gas and electric heating become more expensive there will be an increasing role for district heating networks, supplying heat to consumers through a network of hot water pipes.

As the operators of an electricity network we believe that we have the necessary skills and experience to develop and manage heat networks in our region, and we will be looking for opportunities to grow our business in this area. This would contribute to our aim of providing affordable heat and improving the health of the people of the North West.

Q34. Do you think district heating will play a major role in the future energy mix?

Q35. Do you think that DNOs such as ourselves should be allowed to participate in other markets such as district heating?

Your electricity usage

Q36. We have outlined a few of the developments that we expect in our role over the next twenty to thirty years, but we are also very interested to hear how you think your energy usage will change in the coming years.

Contact us

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.

You can write to:

Phil McFarlane
Investment Forecasting Manager
Electricity North West,
Hartington Road,
Preston,
Lancashire,
PR1 8AF

Or Email us at StakeholderEngagement@enwl.co.uk

We look forward to hearing your views.

List of Questions

Q1. Do you think that the six Output categories are valid going forward into the next price review period?

Q2. Are there any additional categories needed to reflect stakeholders' needs?

Q3. In RIIO-ED2 we will continue to target compliance with all health and safety regulations, but are there any additional areas where you think we should be doing more?

Q4. Stakeholders have previously told us that we should do more to promote safety awareness to young people. How should we best undertake this?

Q5. If we continue with the current rate of improvement in reliability and availability, by 2031 unplanned interruptions will be an average of 28 months apart and last just over 70 minutes. Do you think this level of reliability is acceptable?

Q6. The interruptions incentive scheme only covers interruptions that last more than three minutes. Do you think we should be incentivised to improve our performance on shorter interruptions?

Q7. Do you think that the plan to have no Worst Served Customers by 2023 is sufficiently ambitious?

Q8. How should we identify 'worst served' customers in the future and what level of redress should we offer to these customers??

Q9. Do you think that LV faults should be added to the Worst Served Customer definition in the future?

Q10. We believe that customers will be increasingly intolerant of longer interruptions. What length of interruption do you think should trigger a payment in the future and what should that payment be?

Q11. If we were to deliver the growing investment programme set out above, there would need to be an equivalent rise in tariffs. Do you think this would be acceptable to manage the levels of risk on the network?

Q12. What areas should we look at to best prepare for the impact of flooding events?

Q13. Do you support our view that DNOs are ideally placed to deliver energy efficiency schemes in their geographical areas rather than the current model of giving responsibility to electricity suppliers?

Q14. Do you think that we should make further investment decisions based on the type of customers on the network or should we continue to provide a 'universal' service to customers?

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