8 Innovation

Innovation is one of our core values and we constantly challenge and improve the way we do things. Innovation is about delivering new technical solutions and changing the way we do our day-to-day activities so that we continue delivering more for our customers now and in the future.

8.1 This is an exciting time for our business; we face unprecedented change in the face of emerging challenges and opportunities brought about by decarbonising our energy supplies, the economic needs of our customers and the ever increasing importance of the reliability of energy networks. Our customers and stakeholders should be assured that our business plan is designed to meet these challenges and deliver the benefits, efficiencies and services they need.

8.2 We have an enviable innovation track record. We are leading the industry in developing innovative solutions that transform the way in which DNOs distribute electricity. Our innovations deliver significant benefit for the amount of investment made, with many innovations achieving more than a tenfold return for stakeholders and customers.

8.3 Core to our business plan are three critical developments; our innovation strategy, our smart meter strategy and our smart grid strategy. Our innovation strategy (Annex 29) describes our overall approach to embracing and developing new techniques and technologies for the benefit of our stakeholders. Innovation pervades all areas of our business plan from customer service, asset management planning and field delivery.

8.4 Key to our businesses success will be the realisation of the significant potential of smart meters and smart grids. Our strategy for realisation of the benefits of smart meters is outlined in our smart metering strategy, Annex 28 and Annex 13 outlines our smart grid strategy.

8.5 Our strategy for innovation is aligned to our four stakeholder priorities of reliability, affordability, sustainability and customer service and we measure our success by the level of improvement we make in these areas.

Why innovate?

Changes in future demand on our network and services are inevitable but difficult to predict. Our continued success is dependent upon how we plan for an unpredictable future.

8.6 Over the past five years we have seen dramatic changes in the local, national and global economies and greater demands for the protection of the environment and the communities we serve. These challenges will continue through RIIO-ED1.

8.7 Working with CEPA (Cambridge Economic Policy Associates) we anticipate that over the next 10 years we will see:

Network	Network capacity being pushed to its limits using ageing infrastructure and assets
	Continued unpredictability in economic growth in the region
	Alternative methods for the storage of excess energy and greater flexibility in network loading and capacity
Customers	Customers demanding greater transparency over the way in which they are charged for electricity and more control over their own electricity consumption
	Demands for improved quality of service
	Extensive smart meter roll-out
Carbon and Social	Greater demands for electricity as more customers switch from gas
	Domestic use increasing by up to 20% through the connection of Low Carbon Technology (LCT) to the network
	Continued upward pressure on energy prices

8.8 Unprecedented market uncertainty and increased focus on social and environmental issues over the past five years has taught us that adapting to change quickly is critical. We have used innovation to deliver increased reliability, sustainability, affordability and service for our stakeholders and customers by continuously challenging and improving the way we do things.

8.9 We have an excellent pedigree in leading UK-wide innovation in our industry. Significant cost savings, efficiency improvements and increased levels of customer service are delivered by DNOs across the UK using innovation developed and shared by us. We think we should continue to invest in innovation to support collaboration between DNOs and industry partners and the collective impact of implementing UK-wide initiatives on the national economy.

8.10 We will invest over £26 million in innovation in DPCR5 and propose to invest at least £24 million in RIIO-ED1. These investments will deliver £133 million of customer savings in RIIO-ED1 and an anticipated £180 million in RIIO-ED2.

8.11 Our innovation programme includes work we will complete with our partners, work we will conduct with other network operators and work led by others that we will adapt for use on our network. We are seeking an innovation funding rate of 0.8%, equivalent to £3 million per annum for RIIO-ED1. This funding is essential to allow us to complete our innovation plans and deliver the customer benefits included in our plan.

Innovation principles

8.12 Our approach to innovation is based on the following principles:

- Understanding the changing needs of our customers and stakeholders as the UK decarbonises and the key role we can play in facilitating it
- Seeking to collaborate with partner organisations to develop solutions and learn from or pass on our knowledge
- Focussing upon customer involvement in all our innovation work ensuring that innovative commercial solutions and the evolution of smart customers drives our programme

8.13 This means we have a problem-led rather than product-led approach, which ensures that we target our innovation around meeting needs in the most practical and cost effective way.

Innovation governance

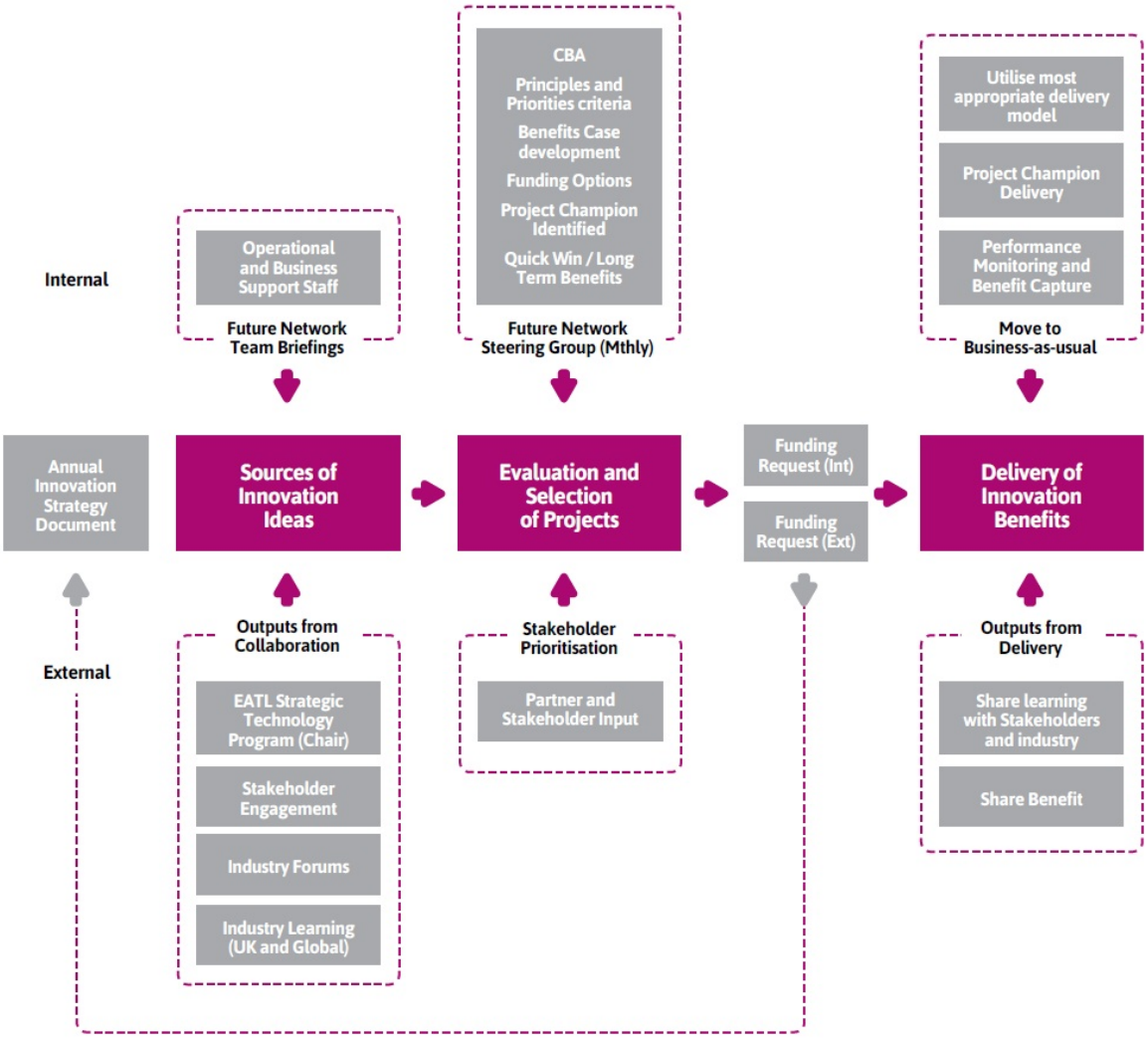
We apply robust governance to the process for identification, selection and delivery of innovation projects.

8.14 This ensures our investment in innovation is tested and validated and the impacts understood prior to rolling out as a business-as-usual activity.

8.15 We have developed an internal process to ensure each innovation project has a subject expert to act as a project champion. The project champion is responsible for defining how the project would be rolled out into business-as-usual and how the project benefits would be measured. We also have a small, centralised team of specialists within our Future Networks team who are responsible for promoting innovation and developing business cases for each initiative.

8.16 We have defined processes in place to ensure every stage of new innovation projects is assessed by representatives from the relevant business section. We also encourage our staff to bring forward innovative ideas and suggestions. The development of the Bidoyng smart fuse is an example of a successful innovation identified and developed by one of our engineers that has now become business-as-usual for us and many other DNOs.

8.17 The diagram below shows the generic governance process in place for innovation, together with the associated fora and reporting requirements.



Funding innovation activities

Innovation is jointly funded by us and customers.

8.18 The Innovation Funding Incentive (IFI) mechanism was introduced in DPCR4 to foster technical innovation within electricity distribution networks. In DPCR5 Ofgem created the Low Carbon Networks Fund (LCNF) Tier 1 and Tier 2, the Smart Grid Forum and Smart Metering Consultation to stimulate the industry to respond to future challenges. Specifically, the LCNF is designed to promote the innovation, trial and deployment of new technologies and commercial mechanisms. We also receive funding from bodies such as the Engineering and Physical Sciences Research Council (EPSRC) to offer under-graduates and graduate students internships within our organisation to work on innovation projects.

8.19 Funding is provided on an annual basis and determined by the submission of well-justified innovation plans for the price review period (see Annex 23). So far in DPCR5 we have funded around £9 million in innovation projects. External funding has contributed a further £8 million.

8.20 RIIO-ED1 introduces a new innovation funding mechanism called the Network Innovation Allowance (NIA), which replaces the existing IFI mechanism, and the Network Innovation Competition (NIC) which replaces LCNF Tier 2. The level of the award is determined by the well-justified innovation plan for the price review period with a clear emphasis on delivering specified output measures.

8.21 This business plan outlines our NIA requirements for RIIO-ED1.

Our track record

Our robust governance process and the application of our innovation principles has helped us select and support innovation projects which have consistently delivered a sustainable benefit for our stakeholders greater than the level of investment.

8.22 We are one of the few DNOs to have successfully invested our DPCR5 IFI funding each year. The success of our LCNF and IFI-funded initiatives means our customers will share in around £140 million of savings which we will deliver by the end of DPCR5. The table below highlights our funded innovation projects and the benefits delivered in DPCR5 and projected for RIIO-ED1.

8.23 Our innovation strategy (Annex 23) highlights our funded innovation projects, the benefits delivered in DPCR5 and projected savings for customers in RIIO-ED1.

Delivering innovation for customers and stakeholders

We invest in innovation to deliver value for our stakeholders, either in monetary terms through more efficient investment or in quality terms through better network performance or customer service.

8.24 Our partners are essential to the success of our innovation strategy; without them we could not harness the technology available to deliver benefits to our customers. We strive to build strong relationships with our partners;

> *"Innovation is approached differently by each of the network companies; with Electricity North West innovation is more innate, with change coming from within the organisation. It is evident that there is strong leadership, and a consistent approach towards innovation, with customer value at the centre."*
>
> *Kevin Tutton, UK Divisional Lead – Smart Grid, Siemens*

> *"We have worked on several projects together with Electricity North West and have always found them to be exceptionally receptive towards new ideas and concepts. Moreover, many of our existing products would not exist had it not been for the open and collaborative approach taken by the Electricity North West leadership."*
>
> *Peter Cunningham, Managing Director, Kelvatek*

> *"In all cases, Electricity North West has demonstrated its commitment to develop and implement solutions which benefit the company, their consumers, and the industry as a whole."*
>
> *Robert Davis, CEO, EA Technology*

> *"Electricity North West is leading the UK in radical solutions to our distribution network challenges and your Capacity to Customers and CLASS projects are of global interest and significance."*
>
> *"Your activities on how low carbon technologies and electric vehicles will affect LV networks are of crucial importance to the EU, and especially in typical European cities such as Manchester."*
>
> *Professor Peter Crossley, Head of Electrical Energy & Power Systems, the University of Manchester*

Innovation Initiative	Funding Type	Project Cost	Benefit	Saving Projection DPCR5	Benefit/ Saving RIIO ED1
Stakeholder Priority - Customer					
Network Operation - Development of a time domain relectometry approach to LV fault finding	IFI	£7,000	Delivers faster repairs with less time and excavations to locate the fault saving repair costs and CML	£3.6m	£14.4m
Network Operation - Delta V Developments & Trial Development of a voltage gradient approach to LV faults finding	IFI	£63,000			
Network Operation - Modular/Master Slave Rezap - Development of an LV autorecloser that will fit into all ENWL's LV fuse pillars and boards	IFI	£316,000	Reduces impact of transient faults by autoclosing post fault		
Network Operation - FuseRestore/Bidoyng - Development of a device to automatically restore a fuse after a transient fault	IFI	£453,000			
Network Operation - Smart Fuse	LCNF Tier 1	£350,000	Reduces impact of transient faults by autoclosing post fault		
Network Operation/Investment Planning - Chromatic Analysis of Insulating Oil - Non-intrusive testing of Insulating Oil	IFI	£116,000	Removes the need for oil samples to be remove from transformers for analysis and allows more frequent oil monitoring		£50k pa
Network Operation - Wide Area Data Gathering - Installation of a Power Line Carrier System	IFI	£95,000	Reduces the reliance on third party telecoms providers and reduces costs and increases security of communications		£100k
Network Operation - Next Generation LV Board/Link Box - LV Network Automation	IFI	£579,000	Release additional capacity from distribution transformers and reduce network losses, load/generation connections at lower cost, improved power quality	-	£5.5m
Network Operation - Customers - Research into the customer/DNO interface and how it can be improved	IFI	£283,000	Faster more accurate information provided to customers -improved customer experience	-	Qualitative
Network Operation - Demand control - Investigation of DNOs' capability to offer technical solutions to support transmission network stability	IFI	£31,000	Allows distribution networks to be used to assist with national objectives for the adoption of renewable energy generation without customers being impacted	-	Qualitative
Network Operation - Composite Link Box Lids - Investigation of composite materials	IFI	£11,000	Provides faster restoration times following faults	-	Qualitative
Stakeholder priority - Reliability					
Investment Planning - Oil Regeneration - Testing the capability of oil regeneration to improve health index	IFI	£270,000	Study with Manchester University into benefits of regenerating transformer oil on site to extend their asset life	-	£33m
Investment Planning - CBRM - Developing the ability to use CBRM outputs to define non-load investment programmes	IFI	£540,000	CBRM was initially developed for DPCR4, we have continued to develop this technique which has become the industry standard approach to asset management - improved asset decisions reliability	>£50m	£65m
Investment Planning/Network Operation – Vegetation Management - Identification and definition of vegetation growth rates as affected by climate	IFI	£298,000	Enables targeted preparation for the affects of climate change	-	Qualitative
Safety Network/Operation - Transient Resonance Study - Investigation into the effects of switching transformers with long cables	IFI	£70,000	Eliminates the need to provide high voltage switching devices on long cables (avoiding costs)	£8.7m	-
Investment Planning - Network Resilience - Investigation into the potential impacts of climate change on network resilience	IFI	£24,000	Enables targeted preparation for the affects of climate change	-	Qualitative

Innovation Initiative	Funding Type	Project Cost	Benefit	Saving Projection DPCR5	Benefit/ Saving RIIO ED1
Safety/Investment Planning - Polymeric Investigation - Forensic Investigation of failed and new insulators	IFI	£56,000	Improves the reliability of high voltage switchgear	-	Ongoing requires quantification
Network Planning - Harmonic Cabling Modelling – Analysis of the technical requirements for the connection of non linear loads	IFI	£9,000	Allows the connection of higher levels of generation without network reinforcement	Avoided Costs	Avoided Costs
Investment Planning - Stay Rod Testing - Non intrusive testing of below ground structures	IFI	£17,000	Testing completed and proved inconclusive and therefore will not proceed, alternative techniques will be investigated	-	-
Network Protection and Control - Fit Calibrate HAT's - Forensic investigation of network load measurement systems	IFI	£24,000	Allows more targeted investments and facilitates connections based on available information	-	Qualitative
Network Performance - Nafirs - Academic Investigation of fault data	IFI	£27,000	Used to develop Quality of Supply Investments and their likely effectiveness	-	Qualitative
Stakeholder priority - Affordability					
Investment Planning - Expansion Planning V2 – Development of network models for demand forecasting and pricing	IFI	£372,000	Allows more targeted investments in reinforcement for load growth	-	Qualitative
Network Design - Earthing - Investigation of transfer potential under fault conditions	IFI	£5,400	Reduces investments in underground electrode systems	-	Qualitative
Network Operation/Design - Fault Current Limiter - Development and installation of a super conducting fault current limiter	IFI	£540,000	Avoidance of network reinforcement to mitigate fault levels exceeding equipment safety ratings	-	£3m
Safety/Investment Planning - OLTC Monitoring - Acoustic monitoring of OLTCs	IFI	£277,000	Enhances safety of operatives following high profile OLTC failures and is also used to assess health of asset for more targeted investments	£750k	£500k
Network Capacity - Dynamic Line Rating - Weather related overhead line ratings	IFI	£323,000	Allows the connection of wind turbines to remote overhead lines	-	Avoided Costs
Network Capacity - Storage - Defining the economic and regulatory benefits of energy storage	IFI	£183,000	Facilitates the connection of low carbon technologies allowing demand management	-	Qualitative
Network Planning - Load Related Risk - Development of load-related output measures to succeed the current Load index (LI) methodology	IFI	£20,000	Allows more targeted investments in reinforcement for load growth	-	Qualitative
Stakeholder priority - Sustainability					
Demand Side Management - DSM Signals - Assessment of DSR price signals	IFI	£15,000	Understand benefits of ENWL's Low Carbon Network Tier 2 project, C_2C-realised through avoiding investment in network reinforcement and Demand Side Response	-	£10m
Network Capacity - Load Allocation - Development of software to project and identity overloads due to the projected take up of low carbon technologies	IFI	£460,000	Improved modelling of inherent capacity on the network as required by local conditions of increased demand and generation	£1m	£600k

Delivering innovation in reliability

Knowing when to invest in replacing, refurbishing or retiring our assets has a fundamental effect on the reliability of our network and the quality of service experienced by our customers.

8.25 We have developed best practice asset management strategies through the development of Condition Based Risk Management and Condition Data Capture, which allows greater visibility of the health of our assets. Once we understand the health of our assets we can then determine the appropriate intervention and investment required. We have led the industry in pioneering this approach and it is now widely used and referenced by all DNOs.

8.26 CBRM helps us develop whole life asset management strategies based on analysis of current and expected future performance. We have invested £500,000 in this initiative so far and have realised approximately over £50 million in benefits through cost and delivery efficiency and scope optimisation. CBRM is now a business-as-usual activity and has played a major part in supporting our business plan.

8.27 With our partners the University of Manchester, we researched the benefits of in-situ oil regeneration for our transformers. We can now regenerate transformer oil on-site through this pioneering technique, reducing the need for removal and replacement and significantly extending the operating lives of our transformers. We have used the IFI investment of £215,000 to defer significant non-load related investment during RIIO-ED1. In RIIO-ED1 we plan to use this technique to avoid the replacement of over 12 Grid and 77 Primary transformers, which will save customers an estimated £33 million.

8.28 We have worked extensively with local police forces and specialist security advisors to develop a number of innovative techniques to complement more traditional security strategies in order to secure our network and reduce the number of customers suffering supply interruptions due to criminal activity.

- Metal theft – A marking system for copper earth tapes and cables that allows positive identification of the materials rendering the materials extremely difficult to dispose of without detection
- Active tracking – New technology adapted from military applications where tracking devices are attached unobtrusively onto most types of substation assets and materials. The equipment can then be monitored and tracked when moved, allowing recovery from theft
- Security hardening – A number of initiatives specifically targeted to limit the impact of theft at substations including a £3.2 million implementation of new electrical mechanical locking systems across 500 sites to prevent illegal access to secondary network substations

Innovation in sustainability

We play a lead role in the Smart Grid Forum and development of the Transform model that is used by all Distribution Network Operators. We have also used IFI funding to develop a more granular network capacity management model.

8.29 We call this the Capacity Headroom model. This model supplements Transform and allows us to understand how our customers use our network now and forecasts the future impact of adopting Low Carbon Technologies such as electric vehicles and heat pumps at an LV individual feeder-by-feeder level. Whilst this model tells us where our load carrying capability has to increase we also use it to more accurately target our future requirement for network reinforcement solutions. This ensures that we can deliver low carbon solutions whilst minimising the cost of network reinforcement for our customers.

8.30 Our stakeholder engagement has clearly shown that in order for customers to adopt these new Low Carbon Technologies, the connection experience must be streamlined and simple. We have led the ENA heat pump and electric vehicle group to implement customer-friendly connections processes.

8.31 We have developed Demand Side Response (DSR) solutions to ensure we can support more sustainable technologies whilst maintaining reliability and affordability. DSR involves customers agreeing to shift their consumption patterns away from times of peak demand. This gives us more options to optimise load capacity and less reliance on reinforcement work. We anticipate that this could save £10 million in reinforcement costs through RIIO-ED1 under the DECC Low scenario.

8.32 During 2012 we worked with the Met Office and other DNOs on the EP2 project to assess the potential impact of climate change on electricity networks. On average 20% of all faults on the low voltage overhead network are related to tree-induced damage. Using Met Office projections relating to the future effects of temperatures, we commissioned work on future vegetation growth rates in defined UK bioclimatic zones.

8.33 The outcome of this research allows us to produce mitigation measures and accurate expenditure forecasts for tree cutting, flood resilience and erratic electricity demand fluctuations attributable to climate change. This means customers will benefit from greater network reliability and reduced asset replacement costs.

Innovation in affordability

The cost of connecting to our network can be prohibitive for some customers. We have invested in the development of innovative commercial arrangements under our LCNF Capacity to Customer (C_2C) programme to make this service more affordable.

8.34 New commercial arrangements allow customers to connect to the network using latent network capacity and offer voltage managed contracts for Distributed Generation customers. The real-time network voltage is used to control the use of existing assets, enabling us to minimise the connection costs of new generation connections. We are the first DNO to enter into these types of commercial arrangements with customers.

8.35 We recognise that developing solutions to address fuel poverty and help our vulnerable customers is extremely important. We have been working with a range of charities and government bodies to truly understand the issues around fuel poverty and how we as a DNO can make a positive difference. We have worked with Save the Children and National Energy Action (NEA) and have hosted a working dinner on fuel poverty with MPs from the North West at the Houses of Parliament.

8.36 We have implemented Connect and Manage strategies for low voltage domestic micro generation such as solar panels. In Stockport we transformed our processes for connecting large numbers of solar panels on the roofs of social housing by introducing this Connect and Manage approach. This reduced costs for Stockport Council considerably, as it negated the need for costly and time-consuming investigations into scenario and load planning. Instead, we simply connected all the solar panels, deployed inexpensive LV monitoring and dealt with a very small number of resulting problems. The trial was so successful that this Connect and Manage approach has replaced our existing process for all solar panel connections.

8.37 We are currently conducting a feasibility study with NEA and Stockport Council on an innovative project to get their social housing stock and tower blocks fit for the 21st century. Rather than spending more money to strengthen the electricity network for social housing through costly reinforcement works, we have taken the innovative approach of improving the energy efficiency and insulation of the properties instead. The energy efficiency reduces the amount of energy required to run the properties and therefore reduces the need to reinforce our network.

8.38 We will trial this approach later in the year alongside other techniques for reinforcement avoidance such as Demand Side Response. NEA believe that this sort of innovative approach not only saves money, and is environmentally friendly, but more importantly directly helps those most in need of support by reducing household energy bills.

8.39 In May 2013 the first stage of a new initiative to become a Smart Energy Community was successfully completed by Wigton in Cumbria. The initiative addresses fuel poverty by putting in place wirelessly-operated smart meters, which provide residents with more visibility of their energy usage to help them control what they use, allowing them to reduce their bills and save money. The first stage enabled the town to control their energy and share findings with the hope of expanding the trial to more homes and businesses in the future.

Innovation in customer service

Analysis of the performance of our low voltage network revealed a disproportionate impact on our customers from transient faults. These are intermittent faults that disrupt customers' supplies but have no identifiable cause and can occur a number of times before the fault is identified and repaired.

8.40 To solve this problem, we have worked with Kelvatek, a technology manufacturer, to develop a number of devices such as the Modular Re-Zap (a unit that switches loads on low voltage networks) and the Bidoyng smart fuse (a device that can automatically restore customer supply in under three minutes).

8.41 These devices have transformed the management of LV network cable faults. We will continue to implement this technology on our network and assist other DNOs by passing on our learning. Our £400,000 investment has resulted in over £2.3 million of price reductions on equipment purchases from our suppliers, a benefit that is passed on to our customers through cost reductions and improved supply.

8.42 Almost 50% of the visitors to our website used a smart phone or tablet to access key pieces of information and over 25% of our website visitors access our website specifically looking for power cut information. With customer input we have developed a mobile-friendly website that fits customer needs by giving customers accessibility irrespective of the mobile device they are using. This is ideal when customers are looking for information during a power cut and the use of a desktop is not an option.

8.43 During 2014, mobile internet use is expected to take over from desktop internet use, making this service crucial to enhancing our customers' interactive experience with us.

Collaborating for innovation

We recognise that we cannot lead on every issue but we are committed to continue the progression of innovation within our industry through collaboration with partners and leadership of national industry forums.

8.44 This role allows us to deliver more value for our customers by ensuring we are at the forefront of sharing best practice and have a position of influence regarding the future needs of our customers and stakeholders.

8.45 The national industry forums we participate in include:

- The DECC and Ofgem led Smart Grid Forum and the Electricity Networks Association (ENA) Futures Group. The Smart Grid Forum is focussed on identifying future challenges for electricity networks, system balancing and removing barriers to the efficient deployment of smart meter and smart grid technologies. This group's work is at the heart of shaping the future decision making and strategic direction of our industry
- We lead the ENA Heat Pump Working Group and ENA Electric Vehicle Working Group. These groups are working closely with manufacturers, installers and other stakeholders to agree on standard UK approaches for heat pump and electric vehicle charger installations
- We chair the Distribution Code Review Panel and through this we have introduced new customer friendly Connections Standards for renewable generation

8.46 We have also collaborated closely with local and national groups to drive innovation:

- The Greater Manchester Combined Authority (GMCA) to prepare for a number of planned heat pump installations stimulated by the Renewable Heat Incentive
- UK Distribution Network Operators through the Strategic Technology Programme (STP) operated by EA Technology and the Energy Innovation Centre. Electricity North West currently hold the chair of the STP Board and use this position to support EA Technology to identify and develop a range of new projects for UK DNOs, including identifying areas of common interest, identifying new asset management techniques, development of new testing techniques and investigation of future trends in low carbon technology adoption

8.47 In addition to these groups we have worked with a network of individual organisations developing innovative solutions for specific problems. Examples include regular knowledge sharing sessions with Liverpool and Manchester Universities, where we define our needs and they explore potential innovative solutions based on their expertise. We also have partnerships with Durham and Strathclyde Universities. Furthermore, we have a number of collaborations with other DNOs and National Grid to drive development of industry best practice.

Our innovation plan

Our innovation plan for RIIO-ED1 needs to adapt to an unpredictable future and we have identified key areas of innovation investment rather than being constrained by specific project definitions.

8.48 Whilst much of our innovation has and will continue to come from within our organisation as a direct response to changing customer needs, it originates in our contacts with manufacturers or as a result of collaboration with other network operators and technology suppliers. Our focus will continue to be on developing innovative solutions which deliver tangible, positive benefits for our customers and stakeholders. In some selected areas such as storage, we will continue to be a fast follower where we will adopt best practice solutions developed by other DNOs as well as continuing to lead at industry level to help create and share innovative ideas for the benefit of all.

Delivering innovation in RIIO-ED1 2015 - 2019

8.49 During this period we expect increasing customer demand and the clustered connection of Low Carbon Technologies to push local network capacity to its limits. We will focus on understanding in greater detail the capability of our network to expand and meet demand increases whilst maintaining exceptional levels of reliability and customer service.

8.50 We will use innovative approaches to provide more from our current network:

- Focus on the collection of real-time data on network performance, capacity and load from automated data capture, including data from smart meters
- Use our Capacity Headroom Model to identify and quantify network capacity and identify areas of strain on our network in real time
- Progress development of technologies currently in research through continued collaboration with our partners to achieve our stakeholder priorities
- Develop and invest in our employees' core skills in the areas of commercial, financial and technical innovation
- Focus on the delivery of priority services for vulnerable customers and those affected by fuel poverty
- Continue our leadership in industry forums and working groups

8.51 We have combined learning from several pieces of research work from the EATL Strategic Technology Programme (a collaborative research group involving all network operators which we chair). This has led to the incorporation of innovative ideas using research undertaken by EATL and by other DNOs with our own developments to give direct customer benefits such as strategies for low voltage domestic micro generation such as solar panels.

8.52 Work undertaken by WPD was extremely useful in developing the various trigger levels in our policies below which it was not necessary to put reinforcement in prior to connection. This allows domestic customers to connect solar panels at a lower cost. Our social housing stakeholders such as Wigan and Leigh council and Stockport homes have welcomed the savings this brings and the speed at which it allows them to install solar panel equipment.

Delivering innovation in RIIO-ED1 2019 – 2023

8.53 Our focus in this period will be the delivery of our data strategy and use of smart meter information to drive further efficiency, reliability and low carbon capacity on our network:

- Micro level data management of network performance

- Move from research and development to industrialisation of developed technologies
- Integration of smart meters into control room systems
- Response to stronger market demand within RIIO-ED1 for DSR and an increased requirement to manage network constraints and balance network supply
- Development of RIIO-ED2 investment plans based on real time data and Demand Side Response outputs
- Roll-out of Smart Grid solutions supporting the increased level of heat and transport load on our network

8.54 The development of smart grids is being championed as a key facilitator in the transition to a low carbon, low cost, greener future for Great Britain. In Annex 13, we outline our vision of a smart grid in Electricity North West and point to a number of key activities and work areas which are contributing to the development of the future distribution network.

8.55 Smart Meters will be installed in the homes and businesses of our customers over the next few years. These devices will help our customers realise savings and benefits never before available. As our customers' usage of and reliance on electricity increases, smart meters will become a vital part of our network management infrastructure.

8.56 Annex 28 outlines how we will use smart meters to improve our services and deliver savings to our customers. As the meter installation programme gathers pace our initial challenge will be to assist electricity suppliers in ensuring customers receive a safe and trouble free transition to the new meters. In parallel with this installation programme we will upgrade our IT systems to be able to use the meter data for the benefit of our customers.

8.57 This IT upgrade programme has already started and to ensure we deliver benefits as soon as possible we have commenced several elements of this work in DPCR5. We are also working with electricity suppliers to ensure customers are properly informed about both the installation programme and the benefits on offer.

Funding our RIIO-ED1 innovation plan

We are requesting a Network Innovation Allowance of 0.8%. This equates to a total value of £23.5 million for RIIO-ED1.

8.58 In DPCR5, we will spend an average of £3.3 million per annum on innovation. This business plan contains a 10% reduction in innovation investment but a significant increase in benefits delivered for customers arising from two factors.

- First, we anticipate that more learning will be available from the wide range of projects being delivered by other DNOs or developed collaboratively with other partners. This allows us to identify and implement best practice solutions without the cost burden of extensive research and development being passed on to our customers
- Second, we have already funded a number of innovations from the efficiencies they yield in our expenditure plans, such as Connect and Manage and our work on promoting energy efficiency. We will continue to utilise this approach in RIIO-ED1

8.59 Funding from the Innovation Roll-out Mechanism (IRM) will also allow us to deliver RIIO-ED1 innovations with our partners for our stakeholders. We are committed to sharing our knowledge and experience with other DNOs through our continued chairmanship of and contribution to industry forums and working groups.

8.60 We also understand that we may not be able to predict the scale and complexity of future innovations. For larger scale innovations we will apply for additional funding through NIC with our partners.

8.61 The diagram below sets out the key areas of focus for the innovation programme, their forecast profile and expenditure.

RIIO-ED1 innovation initiatives

Average annual spend - £2.96m			2016	2017	2018	2019	2020	2021	2022	2023	Projected Project Expenditure (£m)
Reliability	Load impact modelling	LV									0.8
		HV									
	Thermal capability	LV									1.2
		HV									
	Asset management	LV									1.2
		HV									
Affordability	Network configuration	LV									1.2
		HV									
	Reference networks	LV									1.2
		HV									
	Network modelling	LV									1.7
		HV									
	Feeder operational modes	LV									1.2
		HV									
Sustainability	Voltage management	LV									2.0
		HV									
	Feeder design	LV									1.5
		HV									
Customers	Demand side management	LV									2.0
		HV									
	New connections	LV									1.2
		HV									
	High performance computing/ data manipulation	LV									0.8
		HV									
	Automatic fault restoration	LV									1.2
		HV									
	Distribution System Operator services	LV									0.8
		HV									
Commercial	Data clouds	LV									1.2
		HV									
	Development of autonomy	LV									1.5
		HV									
Assets	New materials	LV									2.9
		HV									
Total											**23.6**