



JANUARY 2016

DELIVERING ENHANCED
UNDERSTANDING OF
ELECTRICITY LOSSES



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I. FOREWORD

Losses are an unavoidable feature of operating an electricity network. However, by improving our understanding of where they occur we may better meet our obligations to reduce them.

The programme of work in this document sets out to enhance our understanding of losses in order to deliver losses reduction in the 2015-23 period as well as to establish a baseline and plan for the period that follows. We are implementing processes and exploring opportunities that have the potential to significantly shift the expectation of what we as a distribution network operator can do to manage and reduce losses.

Our proposals focus mainly on improving understanding of so-called technical or engineering losses – i.e. the losses that occur due to the laws of physics as opposed to those that arise due to theft or apparent losses which are actually data inaccuracies. The national smart meter roll-out and the associated move to half-hourly market settlement processes will introduce more accurate metering point data such that the true technical losses may be more readily evaluated. This is just one important strand of the benefits to be delivered by the smart meter roll-out that features as one of our highest innovation priorities for the current period.

The way in which we are using and generating electricity is changing significantly as actions to decarbonise society progress. In particular, the increase in distributed energy resources such as solar panels means that we need to take a whole system view of efficiency and carbon reduction. Distribution network operators are taking an increasingly central role in managing the connection and use of distributed generation as well as enabling new smart grid solutions such as demand side response and storage. This proposal describes how we plan to leverage this central position and enhance our understanding of whole system losses including those that occur outside of our network – in particular within the transmission network as well as on the customer's side of the meter.

We are sharing these proposals and the associated losses strategy with other network operators and the wider set of industry stakeholders. This will aid us to collaborate on projects and share best practice that will benefit customers across Great Britain and not only those that we serve in the North East and

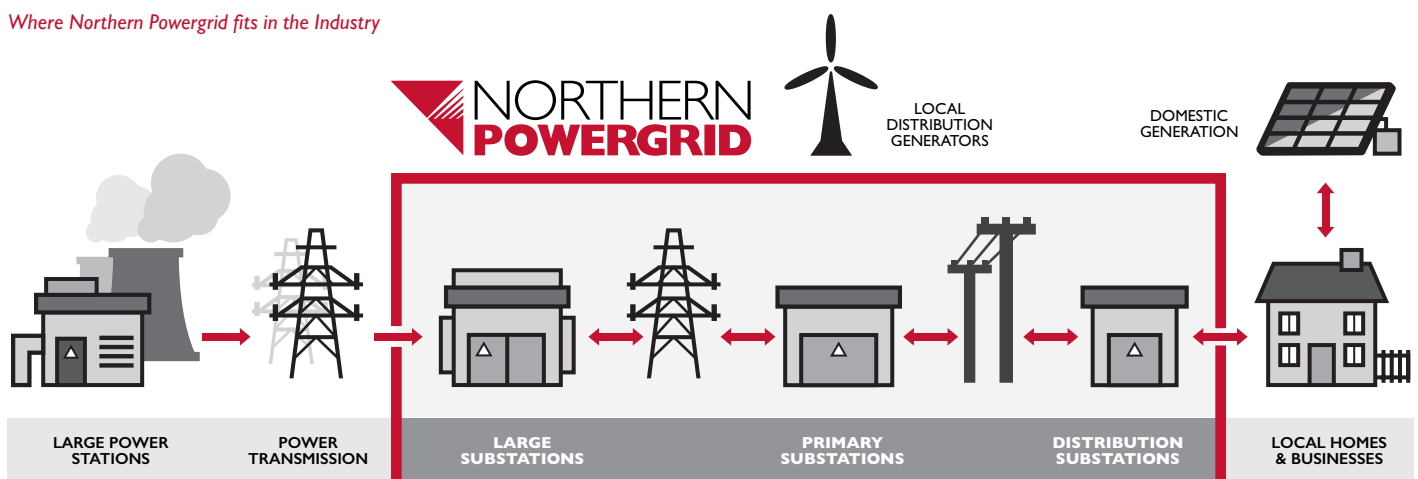
Yorkshire region. Further, dialogue with colleagues in the wider Berkshire Hathaway Energy organisation is a prime route we are using to tap into relevant international experience.

Ofgem will be assessing the merits of these proposals in parallel to this wider stakeholder dialogue. The feedback we receive through the industry dialogue and the outcome of that regulatory judgement will determine how we proceed with these proposals. I look forward to sharing the final plan and our commitments via Your Powergrid, the stakeholder section of our website (www.northernpowergrid.com/your-powergrid).

Mark Drye
Director of Asset Management



Where Northern Powergrid fits in the Industry



2. INTRODUCTION

Northern Powergrid runs the only major electricity distribution network that provides power to customers in the North East, Yorkshire and north Lincolnshire – a population of some 8.3 million people.

We move electricity to and from homes and businesses over our network and the services we deliver impact on everyone who lives, works or even travels through these communities. As part of this vital service we look to ensure that the losses on our network are as low as reasonably practicable, as we realise that these electricity losses have a significant financial and environmental impact on consumers.

Our overall losses strategy for the RIIO-EDI period can be summarised as follows:

- » To seek losses reduction through the selection of equipment and installation designs across the full range of our engineering activity. To bring forward work programmes to target losses reduction when justified by cost/benefit analysis;
- » To use the information flows from smart meters as they become available to better understand and measure losses;
- » To target both the use of Demand Side Response to reduce peak loads and existing reinforcement programmes thereby reducing losses;
- » To review network configuration, both in design and operation, to establish whether the network can be configured to reduce losses and when necessary make these changes;



- » To work with energy suppliers, police forces and other stakeholders in our region to disconnect illegal and/or unsafe connections; and
- » Develop our understanding of losses data sufficiently to consider the re-introduction of a financial incentive on losses performance in the RIIO-ED2 period.

Separately, in our losses strategy document, we describe the discrete actions we are taking to meet our obligation to reduce losses where

reasonably practicable. The purpose of this document is to go beyond this minimum requirement and to propose the additional processes, technologies and engineering solutions that we will adopt as part of the Losses Discretionary Reward process, to better understand and manage electricity losses. Ofgem will assess whether the work proposed meets the criteria set out in its guidance. This consideration will particularly focus on an assessment of the processes that we are exploring and implementing to significantly shift expectations of what we can do to reduce losses.

3. WORK PROPOSED

We set out in this section the work that we are proposing to carry out to enhance our understanding of losses in the RIIO-ED1 period (up to and including 2023).

These proposals are set out in the following sections:

- » Understanding of losses;
- » Effective engagement and sharing of best practice with stakeholders;
- » Processes to manage losses; and
- » Innovative approaches to losses management and incorporating approaches into 'business as usual'.

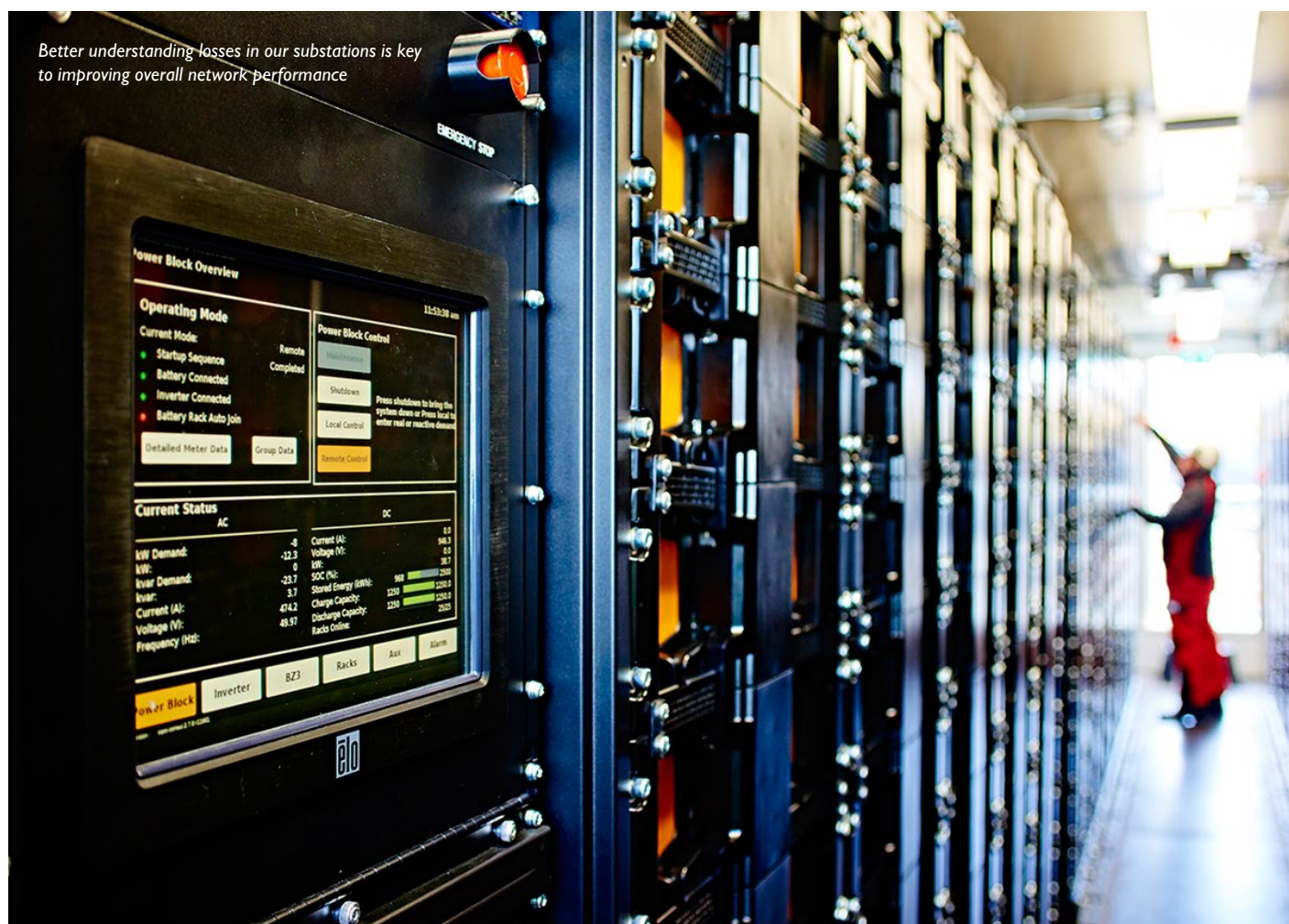
The proposals included here are for a full programme of inter-related activities. They have not yet been fully explored with the other Distribution Network Operators (DNOs) and other stakeholders. As others set out their proposals there should be opportunities to look for synergies and joint areas of interest so that we may collaborate with others and deliver improved outcomes for all GB customers.

The following sections evaluate the proposed initiatives against the specific

criteria set out by Ofgem and provides evidence that we have effective processes in place that will allow us to fully meet all of the requirements.

Where we have included processes in this workplan that are also referenced in our Losses Strategy we have made it clear how these processes shift (or are expected to shift) the expectation of what we as a DNO can do to reduce losses.

Section 4 shows the illustrative timeline for our proposed work plan.



3.1 UNDERSTANDING OF LOSSES

The objective of the proposal is to improve our understanding of losses based on developing further learning within the industry to identify the optimal solutions for our customers and other stakeholders.

We propose to leverage internal resource through the use of experienced third parties to critically review the work in this area and deliver the packages of work identified in this document. The outputs should allow us to make better use of the existing data sources and we will ensure the outcomes are communicated in a manner that all the industry may understand and use to make changes as necessary.

HOW WE ARE IMPROVING OUR UNDERSTANDING OF LOSSES

Losses measurement can be limited by the accuracy of data streams being used in the analysis process. Existing and future distribution networks will contain multiple measurement points at the network boundaries and within the network. Each measurement point will have error margin due to the information and communication technology (ICT) systems and on-site hardware used to sample, record and transmit the measured quantities. It is important in any measurement to properly understand and compensate for the degree of error in input data. Therefore, we will seek to better understand the error margins across the network so that the level of measurement accuracy can be properly understood. Additionally, using multiple measurement points across the network will allow us to more clearly understand the losses performance of network elements that can be used to adjust network models. We will seek to use data from our own and other DNO innovation projects to help facilitate this.

HOW WE ARE CONSIDERING THE NETWORK IN A HOLISTIC MANNER

The distribution network is part of the wider power system that only exists to service the needs of our customers. Therefore, it would be wrong to consider the implications of a low loss distribution network in isolation. Actions undertaken by a network operator, for example to reduce voltage, may appear to reduce network losses but we do need to assess the impact on customer losses which is a function of the nature of customer load. It is also a fact that the actions of a transmission system operator impact the distribution network and vice versa. Therefore, we intend to understand better the losses performance of existing and future customers and how this is influenced by the operation of distribution and transmission networks.

The following table describes the work that is proposed to facilitate the losses discretionary activity over the next three years, until the end of 2019. The cost of the external support from appropriate academic and consultancy partners for the proposed work is estimated up to £800k, as well as considerable Northern Powergrid resource to scope the work, tender the requirements, manage the delivery and communicate the outcomes.



“We strive to reduce the impact our activities and assets have on the environment”

OBJECTIVE: Improving our understanding of the current level and sources of losses on our networks.

PROPOSED SCOPE	WHEN
<p>Enhanced losses forecasting model</p> <p>» Investigate the opportunity of producing an enhanced losses forecasting model which introduces increased sophistication into the losses calculation method and is based on the balancing and settlements Code (BSC) losses modelling; the current model used for the RIIO-ED1 business plan submission; smart metering data; and data from the existing Low Carbon Networks (LCN) fund projects. The objective is that any new models will more robustly quantify the losses on the network and allow us to forecast the impact on network losses of different investment solutions. We believe that this could form the basis for a losses measurement model to be used for RIIO-ED2.</p>	» End 2019
<p>Errors in power flow measurement</p> <p>» Develop a better understanding of the errors in power flow measurement throughout the distribution system and the reliability of the losses data calculated upon it (i.e. understand where we are getting the data from and the associated sensitivity and how it impacts the accuracy of the losses calculations).</p>	
<p>Analyse project data</p> <p>» Analyse data from the Electricity North West (ENW) Customer Load Active System Services (CLASS) and Western Power Distribution low-voltage (LV) Templates projects to understand losses performance. We will also consider any other relevant industry learning that is published.</p>	
<p>Analyse low voltage board monitoring data</p> <p>» Utilise the data from Northern Powergrid's low voltage (LV) board monitoring, which was installed to understand reinforcement requirements, to better understand the distribution of losses at the high voltage (HV) and low voltage network level.</p>	

OBJECTIVE: How we are considering the network in a holistic manner and making efforts to understand how losses on their network affect others.

PROPOSED SCOPE	WHEN
<p>Losses on the customer side of the meter</p> <p>» The load reductions experienced in the ENW CLASS project could be a combination of distribution losses changes, customer losses changes and customer load changes. We will investigate electrical losses on the customers' side of the meter through analysis of existing customer datasets (this could include ENW CLASS, UKPN Low Carbon London, Northern Powergrid Customer-Led Network Revolution and WPD LV Templates).</p>	» End 2017
<p>Adapting network operation to load and losses characteristics</p> <p>» Consider how networks might be operated to different parameters dependent on a particular network's and customer's load and losses characteristics.</p>	» End 2018
<p>Exceptions to loss reduction actions</p> <p>» Explore whether there are any unforeseen consequences of loss reduction actions on distribution networks, other industry actors (e.g. National Grid Electricity Transmission) or certain classes of customer; or specific cases that run against the general case. For example it is already clear that there may be interaction between losses on DNO systems and voltages on the transmission system, and while voltage reduction may potentially reduce customer losses in areas dominated by switch mode power supplies, that same action may increase losses in industrial areas rich in induction machines due to the higher currents they then draw.</p>	» End 2017

3.2 EFFECTIVE ENGAGEMENT AND SHARING OF BEST PRACTICE WITH STAKEHOLDERS ON LOSSES

The objective of our stakeholder engagement is to facilitate clear, open and honest communication that is aligned to the stakeholder standard AA1000 principles of inclusivity, materiality and responsiveness.

Our aim is to:

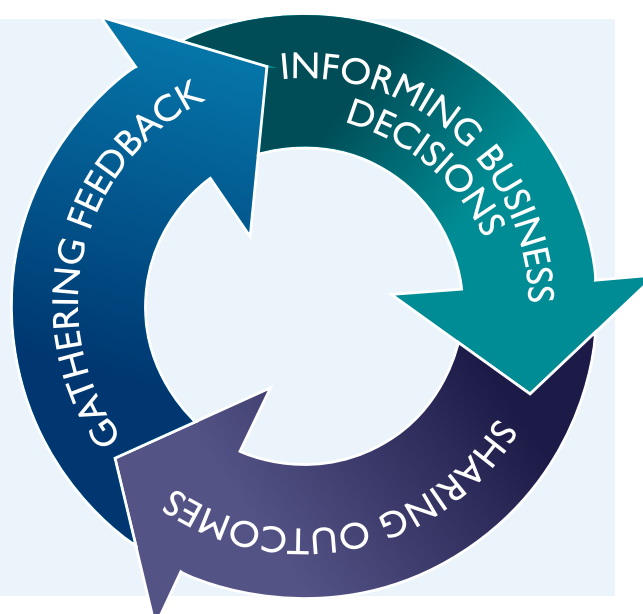
- » Use stakeholder engagement to identify the issues that matter and develop solutions that work;
- » Translate stakeholder feedback into improved services for our customers;
- » Develop our engagement techniques and share best practice;
- » Research, benchmark and adopt best practices to support continual improvement;
- » Review our performance and planning in light of feedback; and
- » Try to ensure that the impacts of our engagement are measurable.

Dialogue with our stakeholders ensures that we align our developments with our stakeholders' priorities by ensuring that we clearly link stakeholder comments to our plans and provide feedback on our response to suggestions – it is important to us that our stakeholders know that we are listening and responding to their opinions. The input from these groups will assist us to comply with our requirement to minimise losses as well as enhancing our understanding.

KEY LOSSES STAKEHOLDERS

- » End users of the system – particularly generators' customer representative organisations such as Citizens Advice and Which?;
- » Local authorities;
- » Equipment suppliers – engagement with the British Electrotechnical and Allied Manufacturers' Association (BEAMA) and the small and medium enterprise (SME) sector through the Energy Innovation Centre (EIC);
- » Environmental groups and organisations – such as the Energy Saving Trust;
- » Energy suppliers;
- » Other GB network operators – including National Grid Electricity Transmission (NGET) and independent distribution network operators (IDNOs);
- » Academic and consultancy organisations; and
- » International operators – particularly our Berkshire Hathaway Energy affiliates.

DIALOGUE LETS US ALIGN OUR DECISIONS WITH OUR STAKEHOLDERS' PRIORITIES



HOW WE ARE PLANNING TO UTILISE STAKEHOLDER ENGAGEMENT

We are building upon and extending our existing stakeholder engagement processes that already comprise a baseline level of broad stakeholder engagement with specialist topics being exposed to more in-depth scrutiny. Losses is now to be considered in the same way that the innovation, customer service and the social agendas have benefitted in the past from this more in-depth meaningful dialogue with professional stakeholders.

In order to inform our losses management actions and allow stakeholders to understand how those actions feed through to their bills, we are planning an extensive programme of stakeholder engagement. Dialogue at our stakeholder panel on losses and the

full range of stakeholder documents being produced in the RIIO-ED1 period has already helped to identify the range of stakeholders with whom we initially plan to engage. As with the rest of Northern Powergrid's stakeholder engagement activities, we intend dialogue to be two-way, and with a commitment to close the loop on engagement with all feedback responded to.

HOW WE WILL ENGAGE WITH STAKEHOLDERS TO DEVELOP RELEVANT PARTNERSHIPS

Effective partnerships are crucial to the development of successful novel outcomes. The process described above will assist us to understand what partnerships could be developed to provide benefit. Our expectation is that we will follow a similar path to the way in which partnerships have been utilised

on our broader innovation portfolio.

Track record, capabilities, value for money and trust are all vital components in establishing relevant effective partnerships. We will be reviewing our existing portfolio of project partners and considering these alongside the others that are seeking to work with us in this area. Ultimately, we expect that we will require a blend of new and old partners to deliver effective outcomes.

Collaboration with DNOs will feature highly in our work plan. We mostly share consistent needs and the understanding we need to develop on losses will be equally valid across all GB networks. There will be local differences on implementation since internal processes, systems and working practices vary from company to company. However, the degree of commonality outweighs the differences such that

KEEPING IN TOUCH

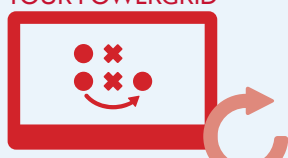
Our digital, print and face-to-face channels help stakeholders to interact with us in a way that suits them.

MONTHLY E-BULLETINS

REACHES OVER
7,000
STAKEHOLDERS



STAKEHOLDER REPORT/ BUSINESS PLAN WEBSITE

YOUR POWERGRID

REGULAR UPDATES

SOCIAL MEDIA

1,600
FACEBOOK FOLLOWERS



ONLINE COMMUNITY

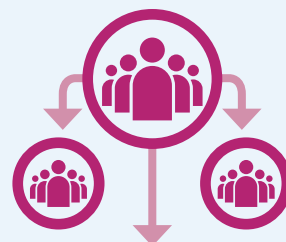
OVER
1,560
MEMBERS



TARGETED E-BULLETINS


MAJOR
EVENTS AND
MILESTONES

CASCADING INFORMATION THROUGH GROUPS



SOCIAL MEDIA

8,000
TWITTER FOLLOWERS



there is an obvious net benefit from collaboration and joint working on some of the work programme. This work will be co-ordinated via the new working group forming at the Energy Networks Association (ENA). This is a key group to facilitate knowledge sharing with its remit including understanding of losses, processes that exist to manage losses and effective engagement.

PROCESSES TO SHARE BEST PRACTICE

The outcomes from the work programmes will be developed with project partners in order to capture and disseminate the key learning points. This will then be published on our website and communicated via stakeholder bulletins and focused bespoke engagement with key parties in order to ensure that maximum GB-scale value is extracted from the learning that is developed. This approach allows for communications to be targeted at an appropriate level for the audience and for it to be delivered cost effectively.

“We will never lose sight of our vision to be the best energy company in serving our customers, while delivering sustainable energy solutions”
Extract from our parent company’s, Berkshire Hathaway Energy, Strategy

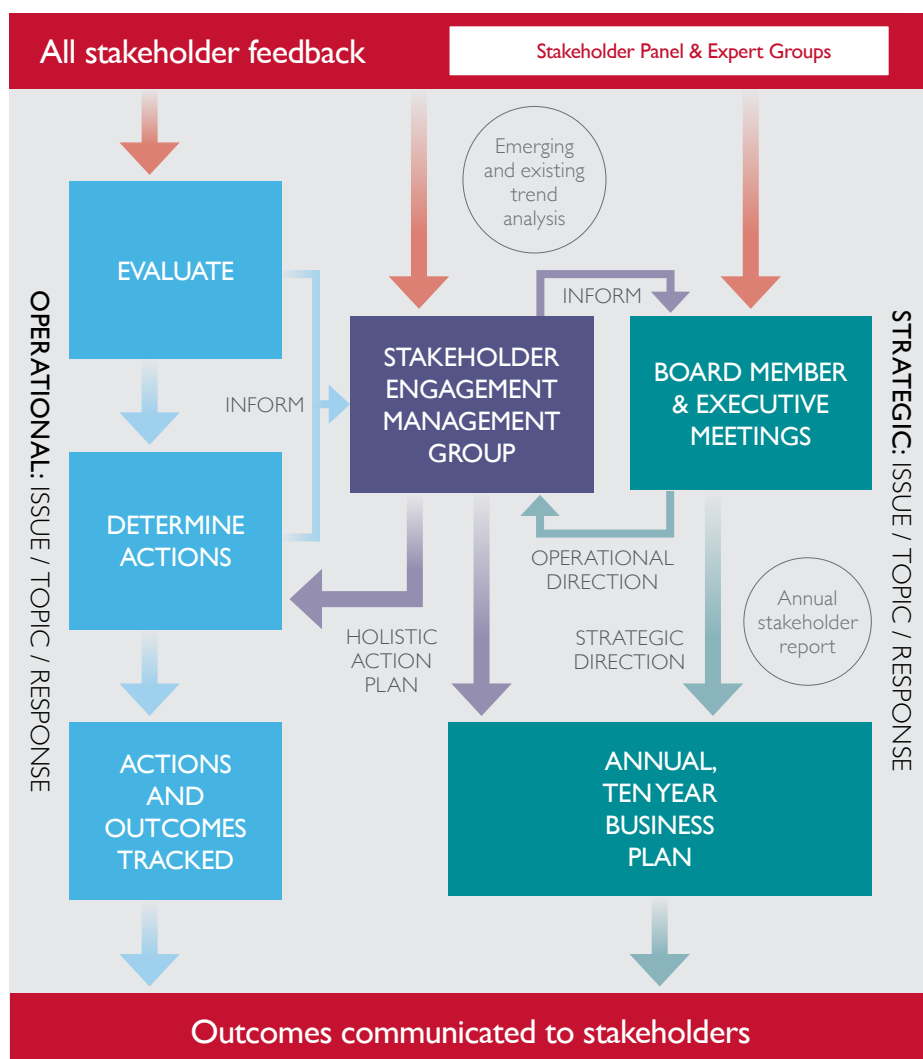
RELEVANCE OF OTHER STAKEHOLDER ENGAGEMENT PROCESSES AND INCENTIVES

Ofgem has understandably sought reassurance that if the proposals contained in this work programme are rewarded through the Losses Discretionary Reward that we are not being funded through other routes in our price control. In particular, there is a stakeholder engagement incentive that is particularly focussed on our services for customers that are more vulnerable. The activities proposed in this programme of enhanced understanding of electricity losses have not featured and will not feature in our separate applications for the stakeholder engagement reward. Rather, the

proposals make use of the stakeholder engagement ‘infrastructure’ such as the Stakeholder Panel and Stakeholder Bulletin that the wider business uses across its functions. The development of materials and messages and the bespoke communication channels that we additionally propose would be funded from either our core funding or the Losses Discretionary Reward funding should we be successful.

The following table describes the engagement that is proposed to facilitate the enhanced understanding of losses over the life of the work plan. The main costs are expected to be related to website developments with the rest of the deliverables being deliver from existing resource.

HOW STAKEHOLDER FEEDBACK INFLUENCES DECISION-MAKING



OBJECTIVE: How we are planning to utilise stakeholder engagement to inform our losses management actions.

PROPOSED SCOPE	WHEN
<p>Stakeholder-led consultation</p> <ul style="list-style-type: none">» Canvas opinion from key industry stakeholders and our online community on the types of actions that they would like to see over and above those already included in our losses strategy document.» Provide updates at Northern Powergrid's Stakeholder Panel. This has already started and will take the form both of presentations at meetings and email updates to interested panel members between meetings.» Host an initiation workshop to review our proposed actions, take feedback and adapt as necessary. This forum will also be used to determine the most appropriate timing and type of future engagements throughout the life of the work plan.	<p>» 2016 and ongoing</p>

OBJECTIVE: We are engaging with stakeholders to develop relevant partnerships which may help to manage losses.

PROPOSED SCOPE	WHEN
<p>Dialogue with our broad range of stakeholders</p> <ul style="list-style-type: none">» Facilitate regular update briefings to share information and gain feedback.» Information included in the monthly stakeholder bulletins (reaching 4,000+ people) and website updates.» Topics published on our online communities platform.	<p>» 2016 and ongoing</p>
<p>In-depth dialogue with expert stakeholders</p> <ul style="list-style-type: none">» Invite parties to form an expert steering group to sanity check the work and provide direction on potential next steps.» Consider inviting third parties to work collaboratively as the project develops, where clear benefits may be gained.» Explore the opportunities for data exchanges with IDNOs regarding losses on their networks.	

OBJECTIVE: Demonstration that we have processes in place to share our own best practice with relevant stakeholders.

PROPOSED SCOPE	WHEN
<p>Holistic and co-ordinated approach to losses</p> <ul style="list-style-type: none">» Participation in the Energy Networks Association (ENA) technical losses group whose purpose is to ensure best practice is shared between ENA members (including DNOs, transmission operators and system operator).» Actively participate in industry working groups working groups with NGET such as the Transmission Distribution interface (TDI) group and the Power Responsive Steering Group.	<p>» 2016 and ongoing</p>

3.3 PROCESSES TO MANAGE LOSSES

The national roll-out of smart meters opens up new possibilities for the management of losses and we are in the early stages of understanding of how we may use this new source of information to design and operate a more efficient and high performing electricity network.

We have set out proposals that will enable us to significantly develop our understanding. One source of learning is the international experience that we and others have in both the roll-out of advanced metering systems or more generally in the development of networks. Northern Powergrid is ideally placed to access some of the learning necessary from its internal contacts within the fellow affiliates of Berkshire Hathaway Energy. Our sister companies, operating in 11 North American states and often vertically integrated in distribution, transmission and retail, provide a valuable knowledge resource for us to access for the benefits of our customers in the UK.

NATIONAL AND INTERNATIONAL BEST PRACTICE

As part of the Berkshire Hathaway Energy group of companies we have been working with our counterparts in the US on the sharing of best practice in the areas of network reliability, connection of distributed energy resources and smart grids. Our parent organisation is a lead supporter of the low carbon transition in the United States, being a signatory to the Climate Change Action Plan that was tabled at the Conference of the Parties Paris Summit (COP21). The management of losses is an important practical step we can take to support our group policy of delivering balanced outcomes for customers including decarbonisation of the grid.

We have valuable US experience of connecting distributed low-carbon generation, developing significant numbers of windfarm and solar farm projects and delivering smart meter benefits.

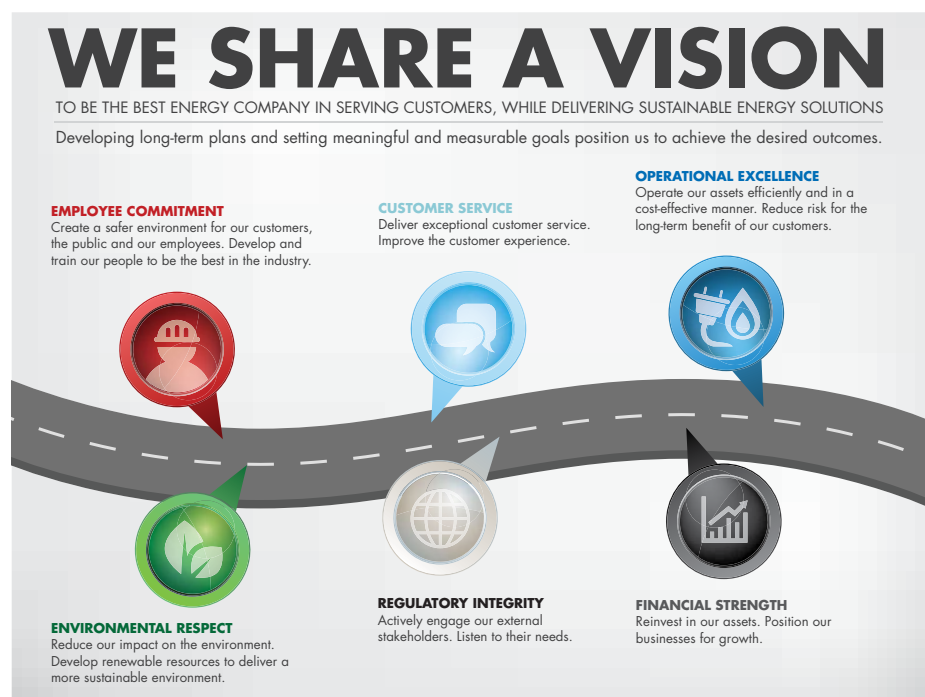
Therefore, through these relationships, we have been exposed to initiatives conducted in the US whose findings and therefore learning may be applicable in the UK. We intend to continue this knowledge sharing and will focus activity in 2016 on losses management opportunities. In particular, we are exchanging information on two separate losses evaluation projects conducted in our sister companies PacifiCorp and MidAmerican Energy Company.

HOW ARE WE PREPARING TO USE SMART METER DATA

We have been actively involved with the technical specification of the smart meters and the overall system since its inception. Indeed one of our network design policy specialists has been a leader for the DNO community on the meter specification, meter and system configuration and data privacy. We are

well placed to understand what smart metering will provide for us and we have supplemented that with the expertise of experienced design engineers to develop our future network design policy and processes. This small team will also develop the functional requirements for future design tools building on work done via our Customer-Led Network Revolution project and leveraging the new asset management systems we are commissioning this year.

The following describes the initiatives that are proposed to facilitate the proposed losses discretionary reward submission over the next three years, until the end of 2019. The cost of the academic support from appropriate partners, for the proposed work, is estimated to be up to £100k, as well as well as considerable Northern Powergrid resource to scope the work, tender the requirements, manage the delivery and communicate the outcomes.



OBJECTIVE: The best practice we have considered when contemplating processes and methods to manage losses on our networks?

PROPOSED SCOPE	WHEN
Sharing international best practice and understanding » Explore international best practice specifically focusing on the work undertaken by Berkshire Hathaway Energy sister companies: » HV losses evaluation – PacifiCorp in Oregon. » LV losses evaluation – MidAmerican Energy Company in Iowa.	» 2016 and ongoing
Sharing UK best practice and understanding » Continually monitor the learning from other DNO projects where there is particular relevance to losses (for example the WPD and UKPN report into “The management of electricity distribution network losses”).	» 2016 and ongoing
Management of non-technical losses » Improved management of unregistered connections (known as ‘untraded’ meter points). We have historically addressed untraded meter point with energy suppliers, their agents and customers to get them registered so that the units are traded and settled correctly. We have proactively raised a formal industry change to introduce more rigour and provide clearer guidance on how to manage customers who are not registered with a supplier – we need to see this work through to its conclusion and build the outcome into our routine operations.	» 2016 and ongoing

OBJECTIVE: How we are preparing to effectively use smart meter data to develop specific actions to manage losses.

PROPOSED SCOPE	WHEN
New progressive investment team » Progressive Investment Team formed (covering losses, smart meters and smart grids) – initially two experienced design engineers that will consider the use of smart metering data, process improvements and policy guidance.	» Complete

3.4 INNOVATIVE APPROACHES TO LOSSES MANAGEMENT AND ACTIONS TAKEN TO INCORPORATE THESE APPROACHES INTO BUSINESS AS USUAL ACTIVITIES

Improved understanding and ultimately reduction in losses is one area of our innovation strategy that we expect to receive more prominence in the coming years. We already have a few areas where we can see work usefully taking place and we further expect this list of opportunities to grow as we engage more on this subject with other DNOs and the wider range of stakeholders.

Another important consideration in innovation is the transfer of innovative learning into business as usual practices. This is as imperative in the area of losses as it is with other categories of innovation. However, in the case of losses, there are actions we propose to encourage this transition – most particularly, changes to our investment appraisal processes to ensure losses is valued at the societal cost. Although there is more to it than re-engineering of our standard business processes this will go a long way to promote the appropriate internal decisions.

HOW WE ARE PLANNING TO USE INNOVATIVE APPROACHES TO MANAGE LOSSES

We have installed on our network a suite of different sized energy storage devices located at different points on our network. These were installed during our Customer-Led Network Revolution project and we intend to maximise the benefits of these devices by using them for losses management and in other innovative ways. We will seek to understand how those storage devices can be used in an optimal manner for network losses management and consider how this service be used in conjunction with other power system services that the storage could provide.

We also expect this work to benefit our evaluation of whole energy system losses – particularly when cycling efficiency losses are taken into account.

HOW OUR FINDINGS WILL BE INCORPORATED INTO BUSINESS AS USUAL ACTIVITIES

The key route we have to ensure that losses management is incorporated into 'business as usual' activities is to include an assessment of the social cost of losses in the options assessments in our investment appraisal documentation. This will ensure that proposals made by engineers are transparent in their effect

on losses at the time management come to make decisions on those proposals. It will also ensure that the proposals and decisions, and their effect on losses, is appropriately documented.

To facilitate this, tools for losses assessment will be rolled out to design engineers and training on their use made available. We recognise that it is not only process or system changes that are required within our company and across the industry to 'price' the societal cost of carbon in the making of investment decisions. There is an issue of a cultural change required that we need to recognise in the training we deliver.

We intend to maximise the benefit of batteries to improve network flexibility



FUNDING OF THE ENHANCED UNDERSTANDING OF LOSSES PROGRAMME

Innovation is funded through a number of different routes. First, it may be funded through our standard price control revenues as is typical for business improvements with short payback periods and more certain outcomes. Innovation funding mechanisms are used for specific projects that qualify for funding and where outcomes are

either more long term or less certain – these can be from within the regulatory price control (e.g. the network innovation allowance) or externally (such as academic research funding or Innovate UK). The Losses Discretionary Reward opens up a new avenue for network operators to fund the kind of activity described in this programme. The specific projects identified in this proposal are not funded under any of the innovation funding mechanisms or specifically linked to any

other RIIO-ED1 period financial initiatives.

The following table describes the initiatives that are proposed to facilitate the proposed losses discretionary reward submission. The cost of the academic support from appropriate partners, for the proposed work, is estimated to be up to £270k, as well as well as considerable Northern Powergrid resource to scope the work, tender the requirements, manage the delivery and communicate the outcomes.

OBJECTIVE: How we are planning to use innovative approaches to manage losses.

PROPOSED SCOPE	WHEN
Innovative approaches to be explored <ul style="list-style-type: none"> » Explore opportunities to use energy storage as a method of reducing system losses (e.g. power factor correction and flattening the load curve) – understand the impact that electrical energy storage can have on our system losses. » Evaluate whether heat generated by electrical losses may be recycled either to offset electricity purchases that are used to maintain substation environments, or by thermo-electrical methods used for harvesting low grade heat. 	» End 2018

OBJECTIVE: How we will incorporate these approaches into “business as usual” activities.

PROPOSED SCOPE	WHEN
Adoption through changes to processes, systems and culture <ul style="list-style-type: none"> » Use of losses cost benefit analysis (CBAs) within the investment appraisal process to ensure level playing field for traditional and innovative approaches. 	» 2016 and ongoing
Consideration of UK best practice and understanding <ul style="list-style-type: none"> » Consider the outcomes from other DNOs' proposals to enhance understanding of losses including their innovative approaches. 	
In-house training <ul style="list-style-type: none"> » Briefing of innovative approaches to design staff and management by the progressive investment team as the approaches become ready for deployment. 	

4. PROPOSED WORK PLAN

SECTION	OBJECTIVE	2016	2017	2018	2019
Understanding of losses	Improving our understanding of the current level and sources of losses on our networks				
	Enhanced losses forecasting model				
	Errors in power flow measurement				
	Analyse project data				
	Analyse low voltage board monitoring data				
	How we are considering the network in a holistic manner and making efforts to understand how losses on their network affect others				
	Losses on the customer side of the meter				
	Adapting network operation to load and losses characteristics				
	Exceptions to loss reduction actions				
	How we are planning to utilise stakeholder engagement to inform our losses management actions				
Effective engagement and sharing of best practice	Stakeholder-led consultation				
	How we are engaging with stakeholders to develop relevant partnerships which may help to manage losses				
	Dialogue with our broad range of stakeholders				
	In-depth dialogue with expert stakeholders				
	Demonstration that we have processes in place to share our own best practice with relevant stakeholders				
Processes to manage losses	Holistic and co-ordinated approach to losses				
	The best practice we have considered when contemplating processes and methods to manage losses on our networks				
	Sharing international best practice and understanding				
	Sharing UK best practice and understanding				
	Management of non-technical losses				
Innovative approaches and implementation into BAU	How we are preparing to effectively use smart meter data to develop specific actions to manage losses				
	New Progressive Investment Team				
	How we are planning to use innovative approaches to manage losses				
	Innovative approaches to be explored				
	How we will incorporate these approaches into "business as usual" activities				
	Adoption through changes to processes, systems and culture				
	Consideration of UK best practice and understanding				
	In-house training				

KEY:

Not Started

In Progress

Complete

5. NEXT STEPS

The proposals set out in this document, along with the associated losses strategy, is being used to support information sharing with other network operators and the wider group of stakeholders.

Through this dialogue we expect to identify where projects could usefully be delivered collaboratively. Also, we will likely refine and improve our plans to take account of feedback from an audience that comprises experts and companies that are themselves exploring broadly similar issues to us.

Ofgem is also assessing our proposals as part of its Losses Discretionary Reward process. We expect this assessment to operate in the period up to June 2016. Ofgem will itself invite comments on our document to inform its judgement through a formal consultation in April 2016.

We will update the stakeholder

section of our website with the outcome of the Ofgem judgement and the plans that result from the dialogue over the course of the next six months.

In the meantime, if you have any comments on the contents of this document please provide them in the first instance to yourpowergrid@northernpowergrid.com.



The roll-out of smart meters and the move to half-hourly market settlement will introduce a more accurate view of the true technical losses on the network

