Electricity Transmission

Our Performance 2017/18

Bring Energy to Life

nationalgrid

Welcome

Executive Summary from Nicola Shaw, Executive Director

The UK is rapidly transforming to a low carbon energy system and we are at the heart of this transformation. 2017/18 has seen several 'firsts', with three consecutive working days without coal fired generation and record levels of renewable generation connected to the system. This changing energy landscape creates new network and system operation challenges. We are managing these through understanding the changing needs of our stakeholders, and a strong focus on innovation. Against this backdrop, I am pleased to report that in 2017/18 our Electricity Transmission business has continued to perform strongly for customers whilst facilitating the transition to a low carbon energy future. We have delivered high levels of reliability, driven efficiencies to further reduce our costs, improved both customer and stakeholder satisfaction, and reduced the impact of our operations on the environment.

Whilst we have done this we have continued to innovate and invest for the benefit of both existing and future consumers.

This year our Electricity Transmission business has delivered strongly against our five primary RIIO output categories:

Safety

This continues to be our first priority as keeping our staff, contractors, and the public safe is paramount in importance. Our safety performance measured by injury frequency rate (IFR) has improved this year from 0.13 to 0.12 and we remain relentless in our focus on improving safety.

Customer Satisfaction

We are proud that our improvements in customer service have been reflected in customer satisfaction ratings which have increased from 7.4 to 7.7. This improvement reflects the focus and hard work across our whole business to improve the way we engage with our customers and deliver what they ask for, when they ask for it. Our stakeholder satisfaction survey score has also increased from 7.66 to 7.88, further reinforcing an improving trend. However, we recognise there is still much more to do as our goal is to exceed the expectations of our customers and stakeholders.

Reliability

The total energy not supplied in 2017/18 was 39.7MWh which is 87% better than target and translates to an overall level of network reliability of 99.999984%. This high network reliability continues to be an area which our stakeholders tell us is vital to them. We are also on track to meet, or exceed, our network replacement outputs measures, ensuring continued reliability into the long term.

Connections

There has been a significant increase in the number of requests for connections to our network in the last year. We have met this challenge, and continued to deliver connection agreements within the required timeframe. We have received the same amount of new applications in the first six months of 2018 as we did in the whole of the previous three years. This has been a huge challenge across our whole business, and we are proud that we have been able to deliver this increase alongside improving customer satisfaction levels.

Environment

We have continued to achieve significant reductions in SF_6 leakage from our equipment. This is important because SF_6, as well as having fantastic electrical insulation properties, is a damaging greenhouse gas. Over 2017/18 we reduced emissions from 11,000kg to 9,615kg of SF_6. Our performance was 23% ahead of our target and this represents our best performance since the start of RIIO-T1.

We forecast to invest over £8.5bn in our network over the RIIO-T1 period. This will support investing in the existing system to maintain the reliability that our customers expect, and to deliver the new investments required on our network to support the transition to a low carbon future.

We are delivering these outputs at lower cost, driving efficiency through investing in our network, creating a leaner organisation, and utilising innovative asset management techniques to operate the system efficiently. We are sharing these savings with customers and forecast to return over £600m during the RIIO-T1 period. Four of the most significant areas where we have delivered savings are:

1
Refining our asset intervention plans will save over £390m, for example introducing a more targeted approach to asset replacement of older, higher risk components;

2
Improving our understanding of the condition of our assets, and amending our plans with this new information. For example in the £200m savings that we have made in our transformer replacements out of over £350m total saving;

3
Finding more efficient ways to deliver work, for instance reducing costs by over £270m in switchgear replacement through new ways of working to reduce time and scope of works; and

4
Improving sourcing and procuring across our activities to drive competition in our supply base to deliver savings of over £150m.

Our revenues are recovered through charging our customers for the services that we provide. Our customers, who supply electricity to end consumers, pass on these costs through domestic bills. Of the annual average domestic electricity bill, National Grid contributes £25.40. This is just under 50p per week for over £8.5bn investment in the transmission network.

Looking forwards, we will continue to engage with stakeholders on a range of issues important to all of us. This includes what the future energy mix could be through our Future Energy Scenarios; developing the future role of the SO in a changing world; and how transmission and distribution networks need to evolve with the expanding role of active demand and changing generation sources.

We are nearing completion of the process to legally separate the Electricity System Operator (ESO) from National Grid Electricity Transmission. We have made good progress throughout 2017/18 and are on track to deliver this as planned by April 2019. This will deliver the flexibility and focus needed to meet the challenges ahead and supports Government and Ofgem ambitions.

We are well underway in building the foundations of our future business plan which covers the next regulatory period RIIO-T2 from 2021. We would welcome and encourage your involvement in this process. We have implemented an enhanced engagement approach with a strong stakeholder focus which aims to ensure that our business plans represent what our customers and stakeholders want. These plans will also be challenged and reviewed by our newly established and independently chaired Stakeholder User Groups before onward submission to Ofgem in late 2019.

I hope that you find this booklet informative and helpful. If you have any questions or feedback, please use the links at the end of the document to get in touch.

Nicola Shaw
Executive Director, UK

Who we are and what we do

We are a Transmission Owner (TO) and a System Operator (SO). This means that National Grid Electricity Transmission (NGET) owns the electricity transmission network in England and Wales – that's the high-voltage network connecting electricity generators to distribution networks and large-scale consumers. We are also the System Operator of Great Britain's entire electricity transmission system, including the Scottish and offshore networks.

Our role is to connect people to the energy they use – whether it's heat and light for their homes or to keep factories and offices running. As society continues to become ever more reliant on electricity for every aspect of modern life, we have a central role to play in meeting one of Britain's biggest challenges: providing secure and affordable energy while also meeting ambitious low-carbon energy targets and connecting new sources of energy to the people who use them.

The unprecedented rate of change in the energy landscape means we must be adaptable and responsive. That's why we invest efficiently to provide world-class reliability and to enable customers to connect to the network. We also promote the development and implementation of sustainable, innovative and economical energy solutions that will help us achieve security of supply.

At the heart of our business plan is the delivery of an affordable electricity transmission network that meets our stakeholders' needs in terms of energy security and environmental considerations.

Over the next decade, we expect to continue our work to modernise the country's energy infrastructure. We know that building new assets or refurbishing existing ones will have an impact on our customers and stakeholders and so we believe the best way forward is to involve them as soon as possible in the decision-making process.

Fundamentals of RIIO – Revenue = Incentives + Innovation + Outputs

New principles

RIIO-T1 started in 2013/14 and lasts for eight years. Under this regulatory framework, we have agreed with stakeholders a set of outputs to deliver. We complete these outputs in return for an efficient revenue allowance set by the regulator Ofgem. RIIO also introduced a range of new principles which drive our performance, these are outlined below.

Risks and benefits are shared with customers

One of the principles of the RIIO framework is to align our interests with those of consumers through the sharing of risks and benefits. This means that, for every pound we save, 53p of this is promptly passed on to end consumers through lower network charges. This ensures that we are focussed on finding efficiencies to reduce costs. During RIIO, over £600m has been returned to customers through the savings that we've made. This means that consumers benefit in both the short and long term.

Incentives are encouraging better ways of working

We are encouraged to improve performance across different areas of our operations through a range of incentives agreed as part of the RIIO framework. For instance, stakeholders want us to improve how we work with them and our customers; we receive rewards or penalties depending on how we perform. There are other incentives to improve our environmental performance (SF_6 leakage) and the reliability of our supply to the distribution networks and other customers. We are changing the way that we work to better meet the outputs that our stakeholders tell us are important to them.

Finding a better way in everything we do

The RIIO framework provides three funding streams to support innovation; the Network Innovation Allowance (NIA); the Network Innovation Competition (NIC); and the Innovation Roll-out Mechanism (IRM). Innovation is not only at the heart of the RIIO regulatory framework but also at the heart of everything that we do. There are many examples where we have identified improvements through innovation projects. These have helped us explore and deliver benefits for consumers. Innovations from early on in RIIO are now embedded and continue to deliver consumer benefits.

Flexible and fixed allowances

In some areas (like connecting customers to the electricity system) the costs to be incurred and outputs to be delivered over the current RIIO period were uncertain at the start because the extent of the work involved wasn't clear at that time. This meant that it was unclear how many, where, and when connections would be required. So our allowances automatically flex using an "uncertainty mechanism", reflecting changing customer requirements. There's also a fixed allowance for the maintenance and asset replacement work that's needed to continue to provide a safe and reliable electricity network. We have used our engineering expertise, new contracting and procurement strategies, and found new ways to deliver these works for less cost than the allowance. Over half of this saving is then passed onto customers through lower network charges. Where major investments are required, RIIO allows for us to confirm the need and apply for additional funding through the strategic wider works (SWW) mechanism.

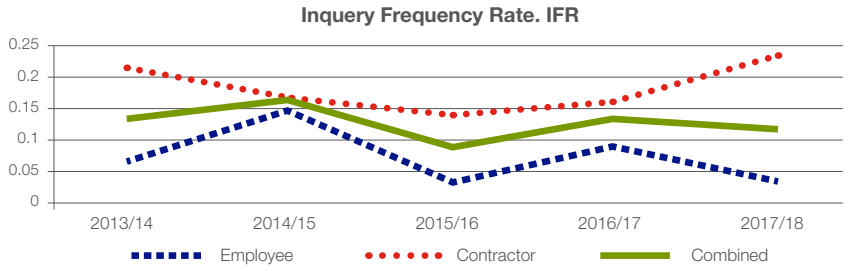
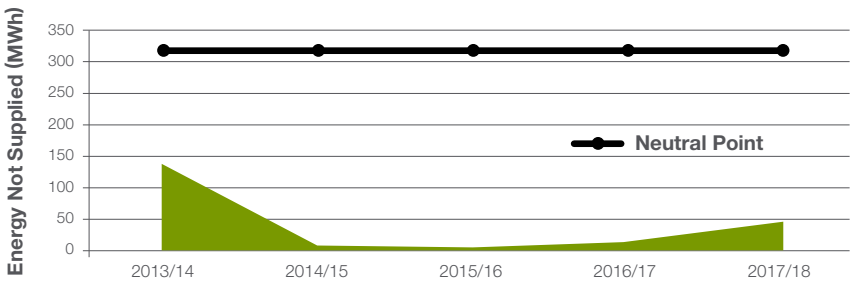
Our Performance Scorecard

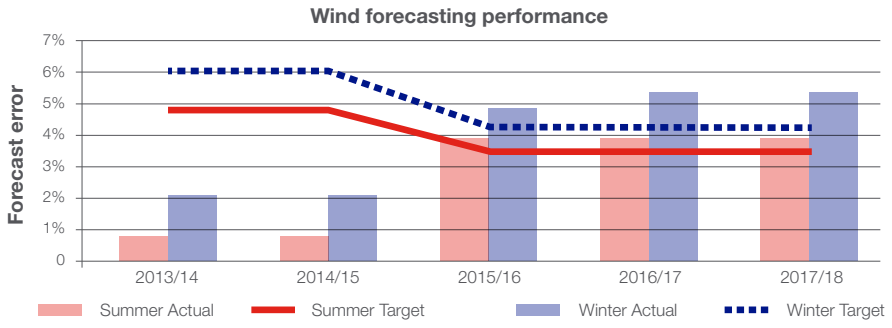
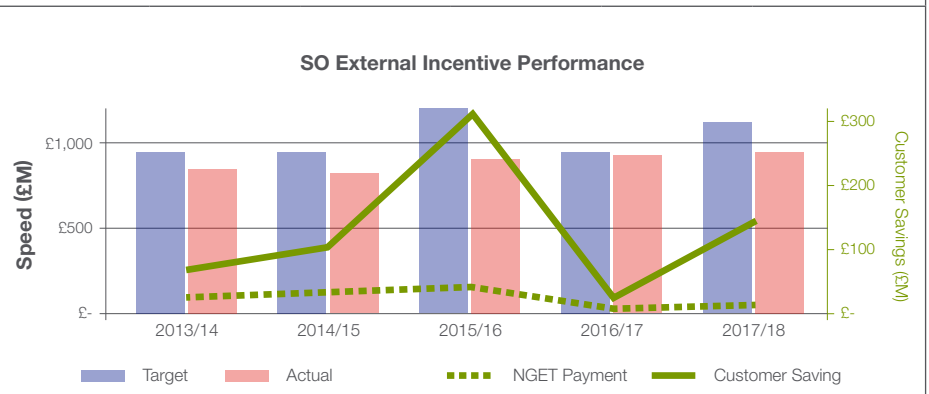
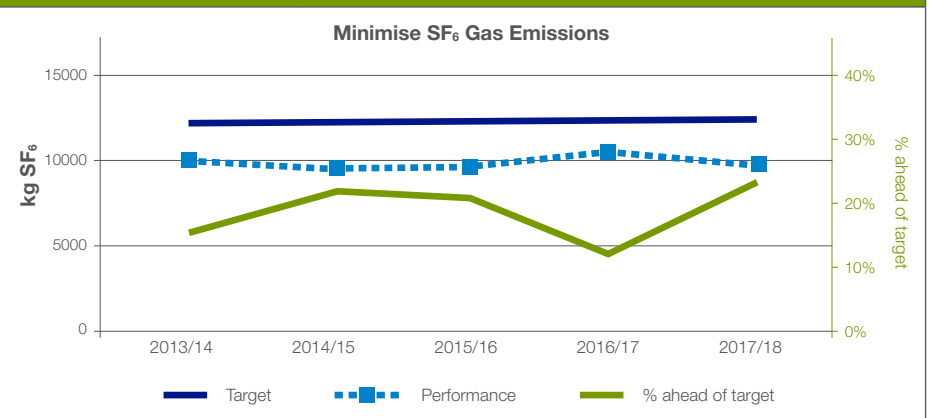
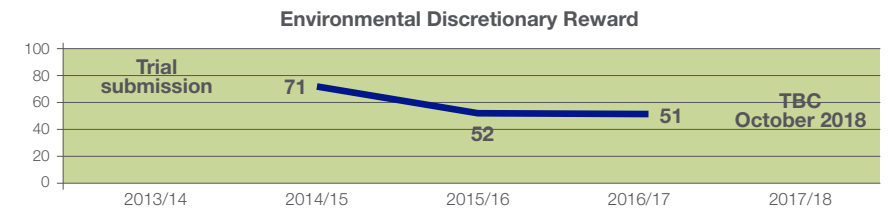
On the next three pages, you can see our in year performance and since the start of RIIO across the five primary output areas for RIIO. The key below describes the meaning of the status colours.

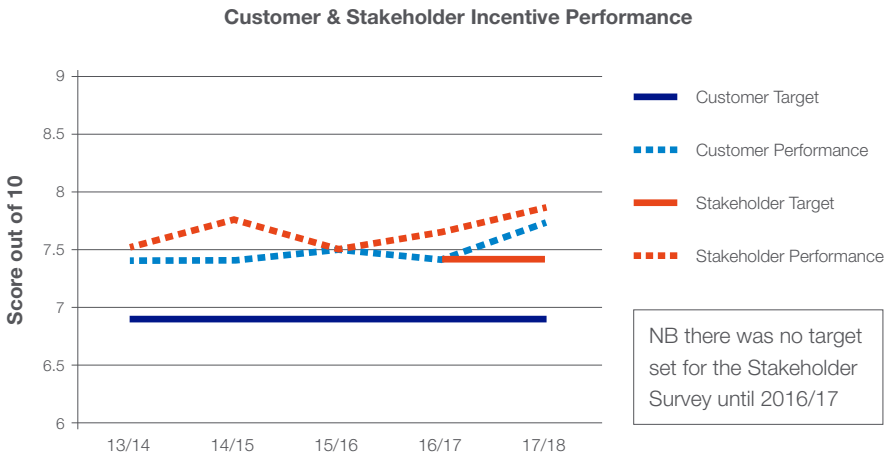
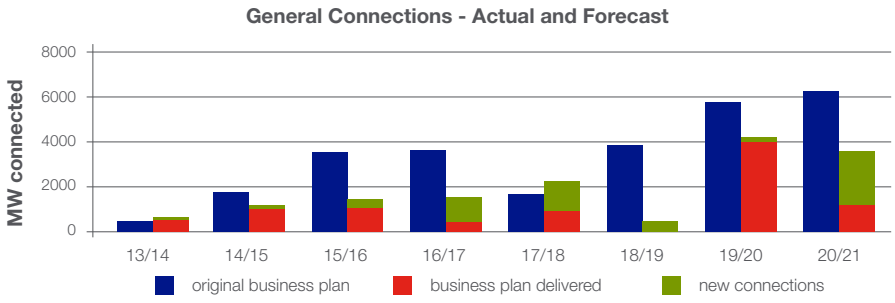
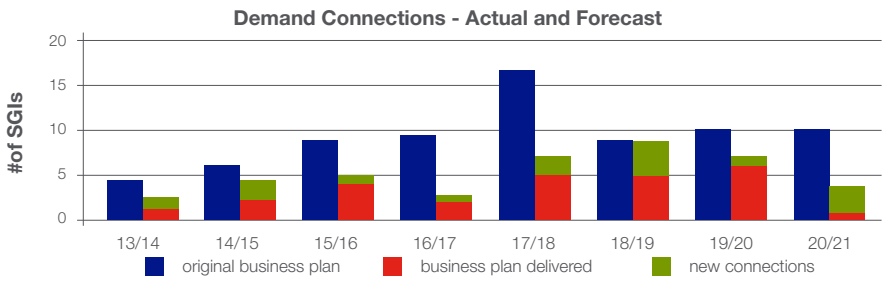
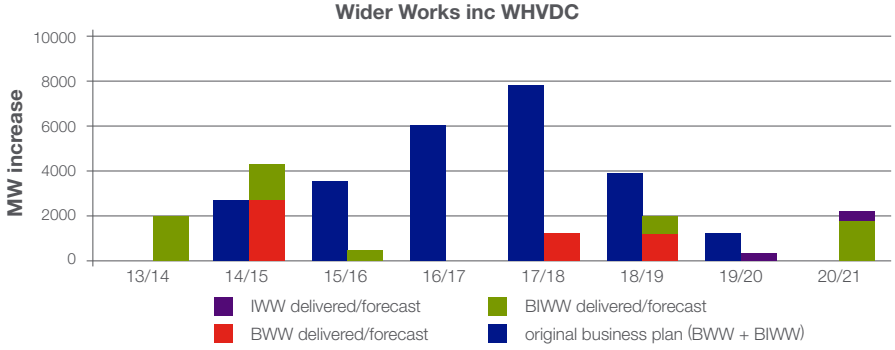
Red - An annual output that has been missed, and forecast to miss our 8-year output.

Amber - An annual output that has been missed but is on target to achieve our 8-year output, or the achievement of annual output but is at risk of failure for our 8-year output.

Green - Achievement of an annual output and on-target to meet our 8-year output.

Output requirement	RIIO target	2013/14 Performance	2014/15 Performance	2015/16 Performance	2016/17 Performance	2017/18 Performance	RIIO 8 year forecast (if applicable)
Safety							
Comply with Health & Safety Executive (HSE) legislation. We continually review our processes to reduce the risk of accidents to the public, our staff, and our contractors.	To meet all safety legislation. requirements.	●	●	●	●	●	N/A
Safety While the RIIO target is compliance with relevant HSE legislation, we use Injury Frequency Rate (IFR), an industry standard measure of safety, to track our performance. The 2017/18 performance has marginally improved to 0.12 since 2016/17.	There is no specific RIIO target.						
Reliability and availability							
Minimise how much electricity is lost to our customers because of failures to the assets on our network. There were 5 Loss of Supply incidents in 2017-18, of which 3 were incentivised. This totalled 39.7MWh of estimated energy not supplied. This performance resulted in an incentive scheme payment to NGET of £3.25m.	We have an incentive to minimise 'energy not supplied' against an annual neutral point of 316MWh.						
Non-load related network replacement outputs							
We are on track to meet the RIIO target. Delivery is costing less than allowances and we are sharing over £600m savings with customers.	Compliant with network risk level at end of RIIO-T1	●	●	●	●	●	●
Protect our critical assets to minimise disruption. We're investing to deliver the programme agreed in 2015.	Agreed programme of work to be delivered	●	●	●	●	●	●

Output requirement	RIIO target	2013/14 Performance	2014/15 Performance	2015/16 Performance	2016/17 Performance	2017/18 Performance	RIIO 8 year forecast (if applicable)
System Operator Incentives							
Forecast the amount of wind generation produced. £3m annual cap and collar incentive based on our accuracy in forecasting of renewable generation output. Performance in 2017/18 was slightly below the target resulting in a penalty of £0.25m.	From 2015/16 the target accuracy is to be within +/-3.5% in summer and +/- 4.25 in winter						
Balance the supply and demand on the transmission system. The System Operator has products and services that it can procure in order to balance the electricity network. We spent £153m less than the target balancing the system. The NGET share of this was £15.3m (10%) but under the terms of the scheme it is capped at £10m. The remaining £143m goes to customers, further reducing bill impact.	Agreed target (blue bar), sharing factor and caps and collars which vary from year to year.						
Environmental benefits							
Minimise greenhouse gas emissions, especially SF_6. The incentive scheme neutral point varies depending on the total inventory of SF_6 on the system. Expressed as leakage of SF_6 from our equipment in 2017/18 it was 12450kg. We beat that figure by some 23% by reducing fugitive emissions to 9615kg. This was a significant improvement on 2016/17 reflecting the negative impact of winter preparations in that prior year. The graph shows percentage performance vs the varying annual target. Our performance has resulted in a payment to NGET under the incentive scheme of £2.72m.							
Going above and beyond to deliver low carbon solutions. The Environmental Discretionary Reward panel meeting to discuss our June 2018 submission will be held in October 2018.	50-70% is proactive 70%+ is leadership						
Customers and Stakeholders							
Go above and beyond in the way we engage with our stakeholders. This is an Ofgem led panel assessment of our submission. The reduced score this year is disappointing. We are currently seeking to understand this.	Neutral Point 4.0	**5.75**	**6.0**	**6.25**	**7.0**	**5.1**	

Output requirement	RIIO target	2013/14 Performance	2014/15 Performance	2015/16 Performance	2016/17 Performance	2017/18 Performance	RIIO 8 year forecast (if applicable)
Customers and Stakeholders (continued)							
Measure the way that we have satisfied our customers and stakeholders. We commission independent surveys with our customers and stakeholders which gives an annual score of their overall satisfaction with the way that we engage with them and the service we deliver. This year we have seen a noticeable increase in the scores compared to both last year's score and the longer-term average score. This reflects the increased focus that we have applied in this area.	Customer survey target 6.9 Stakeholder survey target 7.4						
Customer connections							
We have a licence obligation to send customer offers within 90 days, however we are working hard at reducing this timescale.	**100% of offers within 90 days**						
Connect new generation customers to our network. We delivered all our customers' requirements to progress and deliver their connections in 2017/18. Our 8-year forecast, based on customer needs, is for 12.5W of transmission connected generation (baseline: 26GW), an increase of 2GW on our view in 2016/17. The green bars indicate the amount of new connections, showing the amount of change to our customers' requirements.							
Connect new demand customers onto the network: We delivered all the demand connection requirements that our customers contracted us to complete. We forecast that we will need to connect 40 new Super Grid Transformers and 5km of OHL (baseline 27km) over the RIIO-T1 period. The graph illustrates the level of churn in our customers' requirements (indicated by the volume of 'new connections').							
Incremental Wider Works (IWW) to strengthen specific boundaries. No IWW schemes were completed in 2017/18, although work continues on projects due to deliver in later years. We currently forecast 11GW of boundary capacity increases to be delivered compared to the business plan forecast of 23GW. This position reflects the changing requirements of our customers. The Western HVDC (WHVDC) Link has been delayed due to manufacturing and installation issues but is forecast to be delivered in 2018/19.							

Incentive performance

Reliability and availability

The output that measures our system's reliability is the Energy Not Supplied (ENS) incentive. The total incentivised energy not supplied in 2017/18 was 39.7MWh. This reflects a strong performance compared with the neutral point of 316MWh. If we lose more energy than this neutral point, we are penalised, and if we lose less, we are rewarded. The table below shows that there was a total unsupplied energy of 39.9MWh. However, two events, totalling 0.2MWh are excluded because the duration of the loss of supply was less than three minutes, which do not count towards the incentive. Our sustained good performance is driven by effective management of the network and our asset management approach.

Energy not supplied (ENS)	2013/14	2014/15	2015/16	2016/17	2017/18
Volume of unsupplied energy	135.9	9.8	4.5	89.3	39.9
Volume of unsupplied energy from excluded incidents	0.9	1.1	0.0	82.5	0.2
Volume of unsupplied energy in Incentivised Events	**135.0**	**8.7**	**4.5**	**6.8**	**39.7**
Neutral point (in MWh)	316.0	316.0	316.0	316.0	316.0
Difference (in MWh)	**(181.0)**	**(307.3)**	**(311.5)**	**(309.2)**	**(276.3)**

Customer and stakeholder

Improved engagement with, and listening to, customers and stakeholders, is one of our main priorities. Doing this will better meet their requirements. We have several initiatives to help improve the service that we provide, for instance, in 2017/18 we rolled out a programme focusing on putting the customer experience at the centre of our business. We have equipped our employees with the tools, training and information they need to improve how we serve our customers and stakeholders. As well as serving our customers today, we have a developed an enhanced engagement programme as part of our preparations for the next price control.

In 2017/18, we achieved a customer satisfaction score of 7.74 against a neutral point of 6.90 in the independent **customer survey** that is commissioned. The **stakeholder satisfaction** score was 7.88 against a baseline of 7.40; both scores were our best ever and demonstrate the progress that we are making.

Each year all the transmission and distribution companies submit an overview of their stakeholder engagement in the **Stakeholder Engagement Incentive** detailing activities of the previous 12 months, and how these have informed their business plans. The allocation of this reward is based on an assessment of TO activities by a panel of independent experts, which is chaired by Ofgem. We scored 5.1 – a decrease against our 2016/17 score. We are determined to work harder to improve our engagement throughout the rest of RIIO-T1, and to help us shape our plans for RIIO-T2.

The table overleaf shows the annual scores in the different incentives that we are measured against.

Customer & Stakeholder Incentives	2013/14	2014/15	2015/16	2016/17	2017/18
NGET Customer survey neutral point	6.90	6.90	6.90	6.90	6.90
NGET Customer survey score	7.41	7.40	7.54	7.40	7.74
Stakeholder survey neutral point[1]	N/A	N/A	N/A	7.4	7.4
Stakeholder survey score	7.53	7.74	7.53	7.66	7.88
Stakeholder Engagement Incentive neutral point	5.0	5.0	5.0	5.0	5.0
Stakeholder Engagement Incentive score	5.75	6.0	6.25	7.0	5.1

Environment

There are two incentives that reward or penalise our efforts to deliver a low carbon future. The **SF6 incentive** rewards us for topping up less than the target gas emission and penalises us if we lose more than the target amount of gas from our substation assets. Reducing leakage is important because the environmental impact of SF_6 gas is almost 23000 times worse than CO_2. The table below shows how we're doing so far in this price control:

For the 2017/18 reporting year, we experienced the second lowest SF6 leakage of any RIIO reporting year, with 34% less leakage than the forecast in the original RIIO-T1 business plan. The 1385kg difference between 16/17 and 17/18 performance is a result of our focus on replacing the highest leaking assets. 2017/18 also experienced further repairs undertaken by the switchgear's original manufacturers.

SF6 top-ups	2013/14	2014/15	2015/16	2016/17	2017/18
Actual leakage (kg)	10110	9544	9744	11000	9615
Incentive neutral point (kg)	12056	12158	12299	12349	12450
Business plan forecast (kg)	12950	13370	13830	14310	14780
Difference -actual to neutral point (kg)	1946	2614	2555	1349	2835

The Environmental Discretionary Reward (EDR) submission has been made to the independent panel for 2017/18, using learning from our previous years results. The outcome is expected in October 2018. This discretionary reward, shared across TOs, encourages network companies to find ways to reduce their carbon footprint and act in a more environmentally friendly way. The table below shows our results in first four years of the scheme. Our result in 2017 was once again in the proactive band, showing that we have some activities that meet the criteria. We are listening to the feedback and hope that our 2018 result reflects the improvements that we have made to our performance and submission.

Environmental Discretionary Reward	2013/14	2014/15	2015/16	2016/17	2017/18
Overall total	**Proactive[2]**	**Leadership**	**Proactive**	**Proactive**	**TBC**

[1]The stakeholder satisfaction survey baseline was not established until after the first three years of the price control.

[2]There was no score given in the first year, just an indicative grade. The bandings are <50%=Engaged, 50-70%=Proactive, 70+%=Leadership

Innovation – finding a better way

The pace of change in the energy industry shows no sign of letting up and we recognise that we have a crucial role to play in making sure the UK has a sustainable energy future. Innovation is at the forefront of that challenge.

As part of RIIO, Ofgem introduced two new funding mechanisms for network innovation; the Network Innovation Allowance (NIA) and the Network Innovation Competition (NIC). Both mechanisms enable us to take forward ground-breaking new ideas and technologies that have the potential to make a tangible difference to customers and communities.

NIA and NIC tell only part of the innovation story within National Grid; innovation is central to the work we do every day to keep the energy flowing to homes and businesses across Great Britain, to drive down costs, and to improve the service that we provide to customers and end consumers. For instance:

- We are finding a better way to improve our internal processes to deliver a better customer experience;
- We are innovating to understand more about our assets every day, so we know the best time to replace, repair or refurbish them;
- We are exploring new ways of delivering the outputs that we have agreed; and
- We are using new contracting and procurement methods to reduce cost of delivery.

Themes for innovation

Our NIA projects span both the TO and SO parts of our business. This year, for example, we have invested £6.2 million of NIA funding in 82 projects covering a wide range of network asset and system operation challenges and opportunities. We did not prepare any new projects to enter the NIC for our larger innovation activities. However, we are progressing with winning entries from previous years and look forward to sharing the benefits, including the intellectual property of these schemes with our utility colleagues.

A specific example of one of these projects is the completion of a research programme to extend the life of our overhead line fittings. We now have a greater understanding of how the environment affects our overhead line spans and how the energy input from wind-induced motion and corrosive compounds increases the deterioration rate of conductors and fittings. We can now fine-tune our asset replacement plans and target spending on the assets with the highest risk of developing defects and failures. So far, we have analysed 480km of line, reducing our RIIO-T1 spending by £72m.

Where we're investing for the future

Exciting new areas for future innovation are in:

- Electric vehicles (EVs). We are working closely with Government and Industry to understand how the transmission network can support the increase in EVs;
- Battery storage. We are engaging with our customers to find ways to integrate this technology into the transmission system;
- Community energy. We are working with Government and community groups to understand how we can work with them to build capacity; and
- Embedded generation and interconnectors. We are committed to increasing the diversity of energy supply to increase energy security and these are two areas that we are involved in.

Some of these development areas may lead to future entries into the NIC.

Creating a testbed for technologies

The Offgrid Substation Environment for the Acceleration of Innovation Technologies NIC project (also known as The Deeside Project) is a 5-year project that started in December 2015. The project aims to research, deliver and demonstrate a platform that facilitate the accelerated development of innovative technologies and concepts into business as usual. This increase in speed will deliver benefits to consumers faster and allow the de-risking of more complex, disruptive innovations. The project modifies a 400kV substation that has been taken off the wider network into an easily reconfigurable facility capable of replicating a live substation environment. The project is managed through a technical advisory board, which comprises industry stakeholders.

We won £12m of funding in 2015 through the Network Innovation Competition and we're investing another £14m in the Deeside project. The facility is expected to break even in terms of costs to consumers by 2021 and deliver long term benefits to consumers thereafter.

New opportunities from and for distributed generation

The energy landscape across Great Britain continues to change, particularly with the growth of renewable and small scale generation. Our portfolio of projects seeks to address these changes and to anticipate the challenges that lie ahead. The Power Potential project, is an example of how we're seeking to harness distributed energy sources such as wind turbines and solar panels in a new way.

Together with UK Power Networks (UKPN) we're using £9.5m of innovation funding to explore whether sources of generation connected to the distribution network can be used to provide services such as dynamic voltage control. By 2050, the project could result in cumulative savings for consumers of up to £412m.

Collaboration is vital

Although technology is a crucial component of our innovation portfolio, the real driving force behind the work is people, and the projects draw on the expertise of colleagues from right across our business. We also reach out beyond National Grid and in the past year we've worked with 55 different suppliers and partners, including universities, distribution network operators (DNOs), equipment manufacturers, technology companies and many others.

Looking ahead, we'll continue to work on the projects that are already underway in close co-operation with our external partners. Later this year, in collaboration with the Energy Networks Association (ENA) and the other GB electricity networks, we will prepare an electricity networks innovation strategy.

Find out more about our pioneering innovation work by downloading the NGET Innovation Annual Summary.[3]

[3] *https://www.nationalgrid.com/sites/default/files/documents/National-Grid-Electricity-Transmission-NIA-Annual-Summary-2017-18_0.pdf*

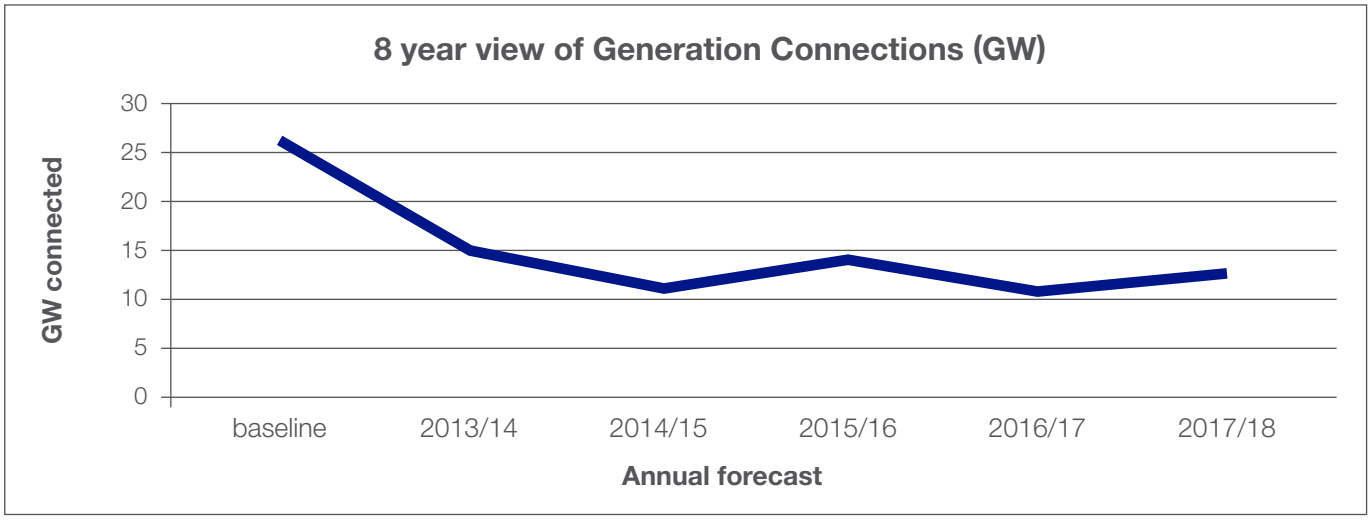
Uncertainty Mechanisms and potential strategic wider works

Managing customer's changing requirements

In the RIIO-T1 price control discussions, it was agreed that some customer driven outputs could be described, but the volumes and timing were less certain given how far into the future they were. The RIIO framework deals with this by flexing our allowances as we deliver outputs in different volumes and at different times in response to changing customer needs. This protects end consumers when less or later outputs are required as we will return allowances, thus reducing customer bills.

Generation connections

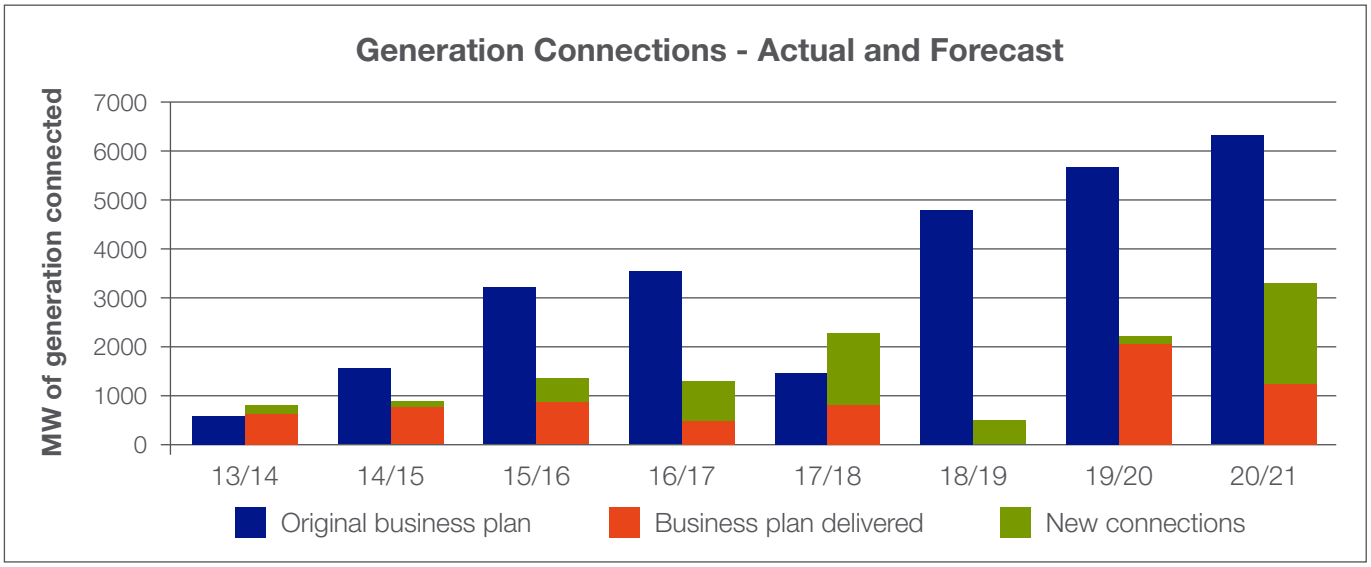
At the start of RIIO-T1 we forecast 26GW of new customer connections, using contracted and best information available at the time. As the forecast volume of new generation has significantly reduced to an 8-year forecast of 12.5GW (though up from 10.5GW last year), this then feeds through to reducing the allowances that we receive. This is because we were given a £/kW allowance and our revenue is automatically adjusted as the volume and timing of connections change. How the volumes forecast to connect have changed through the RIIO period is shown on the graph below;



Embedded generation increases

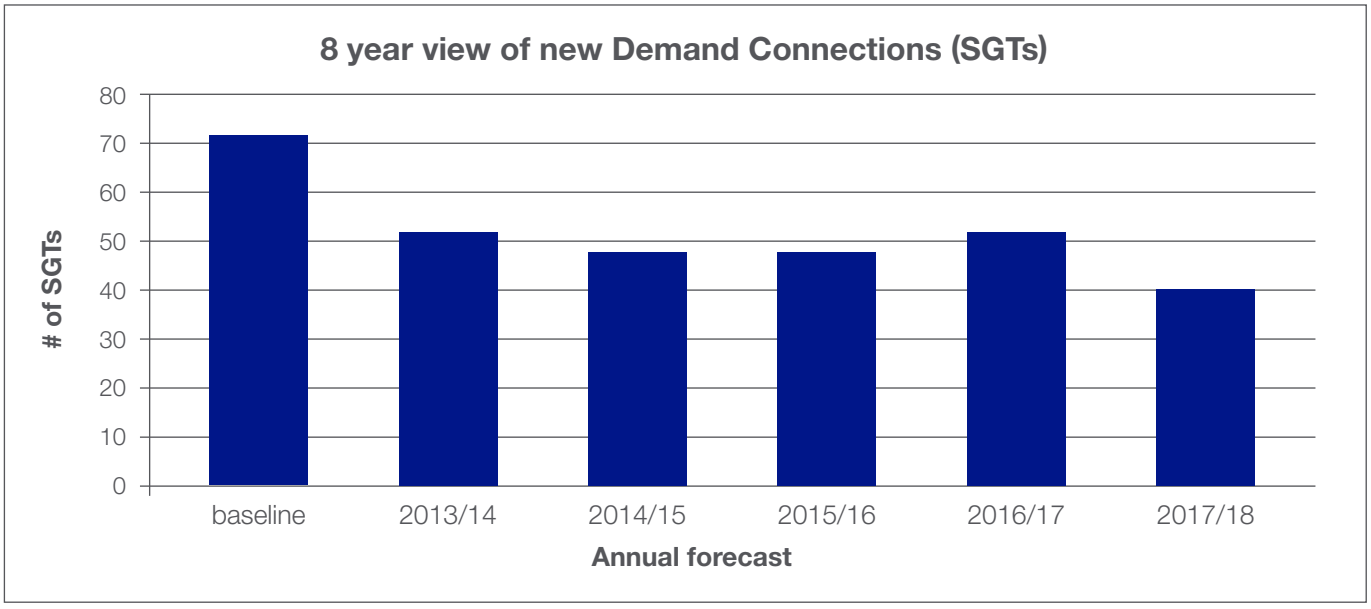
It should be noted that while the anticipated volume of transmission connected generation has fallen, the level of generation connecting at the distribution level remains high. In the last five years, 15.8GW of embedded generation has connected, with approximately another 7.5GW anticipated in the remainder of RIIO-T1. This may necessitate additional investment in shunt reactors and other transmission solutions that are not funded through the uncertainty mechanisms. Embedded generation will also affect the needs of the wider transmission, increasing and decreasing flows depending where it connects and who it is likely to displace in the energy market.

The chart overleaf shows how the volume of connections delivered has changed from the original plan (this excludes the effect of embedded generation). This highlights the overall uncertainty, that whilst forecast generation may not arrive, there will be other new generation connecting.

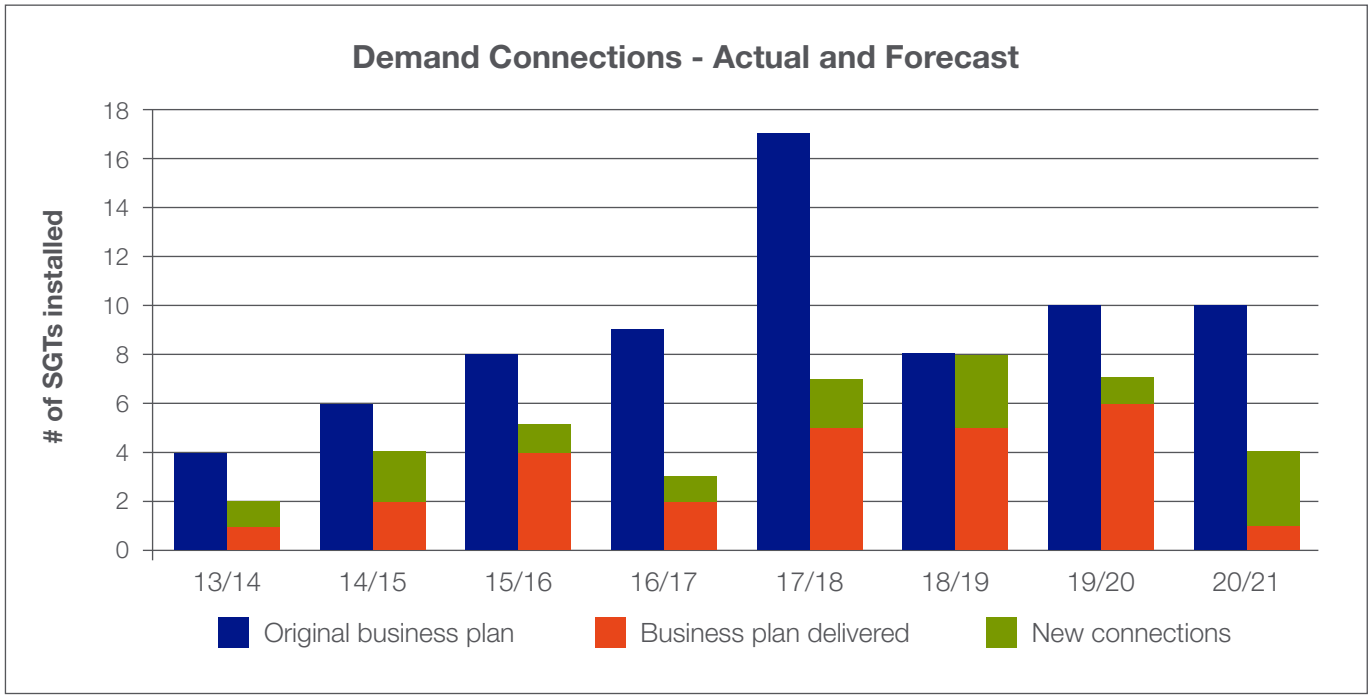


Demand connections

The volume forecast at the start of the price control was for 72 new SGTs and 27km of new overhead line. As customers' needs have evolved, we have delivered a reduced number of new connections, shown below. As with generation, demand has a unit cost allowance that automatically flexes our revenue as our customer needs changes. There was a baseline of £3.9m per new Super Grid Transformer (SGT) and associated substation works and £1.1m per km of overhead line. As we have delivered less this has directly reduced our revenues through flexing allowances downwards by the unit cost of 32 SGTs.



Currently, the external changes have resulted in spend being forecast to be £71m higher than allowances, which is a result of the current mix of projects costing more than the unit cost allowance (£6.4m/SGT vs £3.9m/SGT in 09/10 prices). It should be noted that the average unit cost of the portfolio is sensitive to the mix of projects proceeding. Again, the two tables show the annual 8-year forecast and how this is broken down by each year (5 years of actual and three years of forecast). The amount of new connections again shows the level of change during the current price control period.



Wider network reinforcement

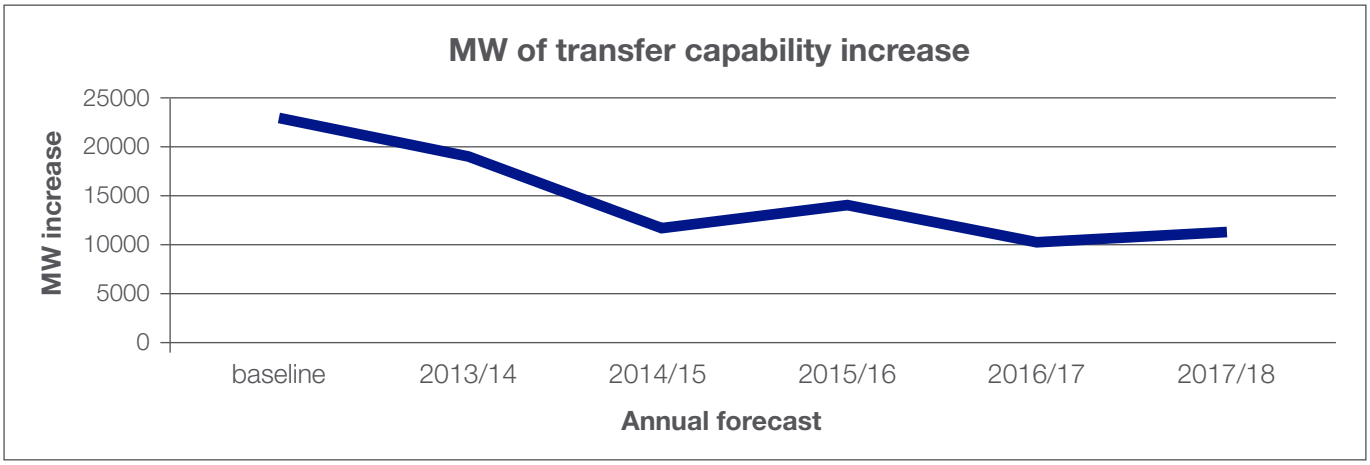
A third key area of uncertainty manged under RIIO mechanisms was for strengthening the network to allow safe and reliable flow of electricity from the forecast increase in generation and demand. This is called wider works. This mechanism works on transfer capability delivered across defined system boundaries. At the start of RIIO-T1, there were some investments that were certain and are detailed in the chart below as baseline wider works (BWW). There were a second group of schemes, which when selected from a larger pool of possible investments, made up the baseline incremental wider works (BIWW). The final group of schemes shown in the chart, are incremental wider works (IWW) which are schemes that aren't in the baseline but have been identified as investments to be delivered during RIIO-T1.

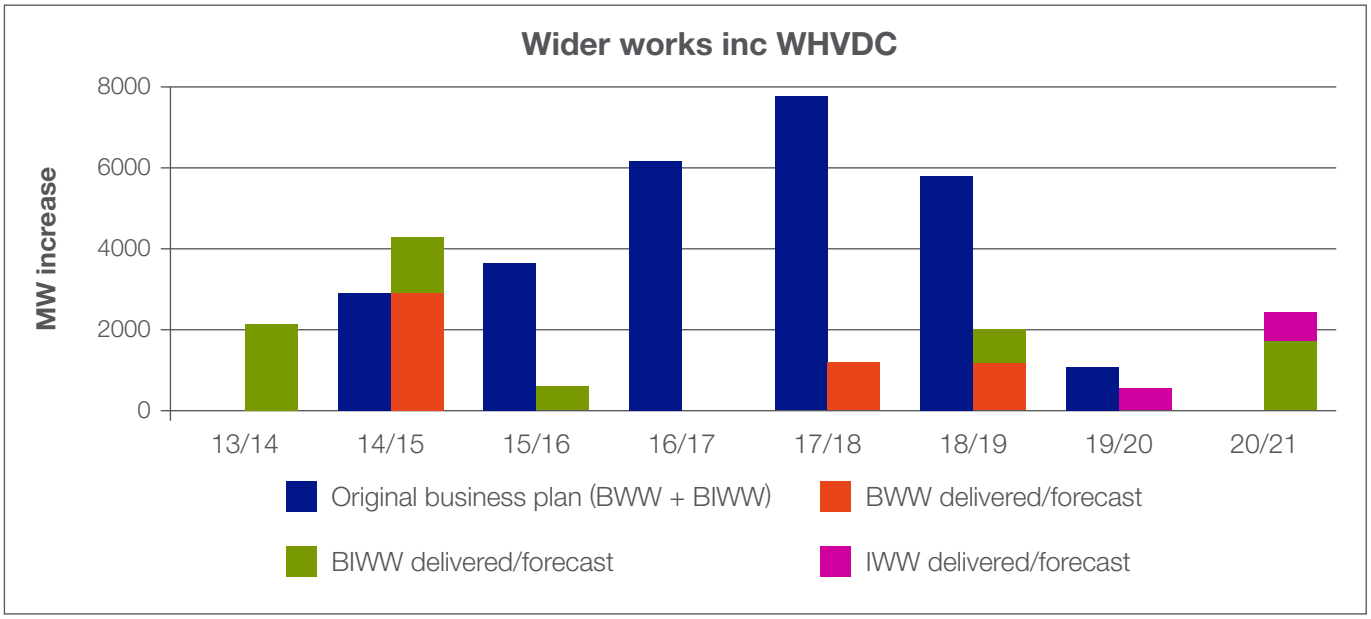
Each year, we publish the Network Outputs Assessment (NOA)[4] which assesses various investments using all inputs (customer requirements, timing, network topology etc.) and provides a cost benefit analysis on whether to progress upgrades on individual boundaries. This leads to upgrades (based on the most up to date information) being recommended that are likely to vary from those proposed when the original business plan was constructed.

As with generation and demand mechanisms we have unit costs allowances (UCAs) for increasing boundary capabilities. These were constructed from the cost of a range of likely reinforcement options. As the forecast boundary requirements change (these are published in the NOA), the TOs react to these by changing investments plans. The revenue forecast in RIIO-T1 final proposals will automatically adjust by these UCAs, ensuring our revenues match customer needs.

The two charts overleaf show these reductions from the original baseline and how the mix of solutions has also changed.

[4] *https://www.nationalgrid.com/sites/default/files/documents/National-Grid-Electricity-Transmission-NIA-Annual-Summary-2017-18_0.pdf*





The table below shows the baseline wider works

Project	RIIO-T1 Allowance (09/10 prices)	Expected delivery date	Output	Output complete
Scottish Series and Shunt	£51.6m	2014/15	1000MW	Yes
Harker – Hutton – Quernmore	£62.2m	2014/15	400MW	Yes
Penwortham QBs	£4.3m	2014/15	1400MW	Yes
Western Link	£621.1m	2018/19	2400MW	Partially (1200MW)
Total	**£739.3m**			

Across the portfolio of baseline wider works, there has been an underspend compared with allowances. The reasons for this were; additional works required in the Series and Shunt scheme to fix post commissioning faults, and reprofiling of spend in the Penwortham scheme meant that costs were greater than allowances. For the Harker – Hutton – Quernmore re-conductoring scheme, costs were less than allowances due to efficiencies in contracting and delivery. For the Western link project which has commissioned half of the capability increase, we are forecasting to spend less than allowances and will report on the full reasons for this once the scheme is fully complete.

Cost and revenue impact

8-year view of Capex and Opex

We are working hard to deliver our agreed outputs for less than allowances, sharing this benefit with customers. We have reduced costs in our capital plan through driving efficiencies by:

1. Refining our asset intervention plans, for example introducing a more targeted approach to asset replacement of older, higher risk components;

2. Improving our understanding of the condition of our assets, and amending our plans with this new information. For example the savings that we have made in our transformer replacements;

3. Finding more efficient ways to deliver work, for instance reducing costs in both non-load and load related portfolio through new ways of working to reduce time and scope of works; and

4. Improving sourcing and procuring across our activities to drive competition in our supply base to deliver savings.

Capex performance – load related

On load-related investments, which are driven directly by customer need, we anticipate spending £3,330m across the eight-year period, a £519m reduction compared to our forecast last year of £3,849m. This compares to allowances of £3,921m, a reduction of £226m on last year. This reduction in allowances primarily reflects the updating of our forecast of customer connections that are due to be delivered in the first two years of RIIO-T2. Overall, we forecast the difference between allowances and expenditure to be £591m across the whole of RIIO-T1.

Across the eight years of RIIO-T1 the major influence on the difference between expenditure and allowances has been the changing requirements of our customers. This comes out in the number of contracted generation and demand connections required, along with the associated wider works for these connections. The net impact is that our expenditure is £380m is less than allowances. Within this load-related category of expenditure, we have identified that £355m of this can be attributed to efficiencies.

Capex performance – non-load related

On non-load related works, driven by maintaining asset health to reduce network risk, we anticipate investing £4,134m against an allowance of £5423m; representing a saving of £1,289m (24%) across the RIIO-T1 period. This represents a further £123m of efficiencies when compared to our forecast last year. These savings (using the 53/47% sharing factor) will be shared with customers.

Opex Performance

Our current year TO Opex was £279m against allowances of £265m, reflecting an overspend of £14m. This overspend is mainly due to higher costs incurred in our business support costs and property management activities, balanced with reductions in HSE costs, planned maintenance costs, and business transformation activities .

Our SO controllable costs have increased in 2017/18 from £112m to £119.4m against allowances of £119m, with the biggest driver for this £7m increase in costs being the additional work being undertaken to achieve legal separation between the SO and the TO.

Therefore, across SO and TO, our overall total expenditure forecast for the RIIO T1 period is £11.72bn set against forecast allowances of £13.56bn which is a £1.84bn reduction of costs below allowances.

Costs and revenue impact – actual revenue v allowances for reporting year

We have published below a table showing (in both the electricity TO and SO businesses) what we have spent to date and what we forecast to spend in the rest of RIIO-T1. The first part of the table is called total expenditure (Totex) as it includes both our capital expenditure (Capex) and our operational expenditure (Opex)[5].

The next part of the table shows our adjusted allowances[6] for the first four years of RIIO, our forecast allowance for 2017/18 and for the remainder of this price control. The final part of the table shows the difference between costs and adjusted allowances with negative numbers meaning costs exceed allowances.

2.4 (a) Actual/Forecast Expenditure (£m, 2017/18 Prices)		Actual	Actual	Actual	Actual	Actual	RII0-T1 Forecast			
		2014	2015	2016	2017	2018	2019	2020	2021	Total
TO	Load Related Capex	722.81	557.36	510.60	380.34	256.80	204.34	336.93	360.56	3,329.74
	Asset Replacement Capex	280.34	202.15	231.89	320.44	354.87	358.75	384.60	416.37	2,549.40
	Other Capex	230.83	74.70	163.48	137.80	139.73	271.99	469.06	472.20	1,959.80
	Non-Operational Capex	38.74	30.88	39.99	52.28	39.16	48.52	43.30	23.96	316.82
	Total Capex	**1,272.72**	**865.08**	**945.96**	**890.87**	**790.56**	**883.60**	**1,233.89**	**1,273.08**	**8,155.76**
	Total Controllable Opex	**262.21**	**287.41**	**292.45**	**268.30**	**276.42**	**285.64**	**280.63**	**255.95**	**2,208.99**
TO	**TOTEX**	**1,534.92**	**1,152.49**	**1,238.41**	**1,159.16**	**1,066.98**	**1,169.24**	**1,514.52**	**1,529.03**	**10,364.75**
SO	**Non-Operational Capex**	41.04	43.84	42.60	57.39	62.08	78.27	60.08	45.30	430.61
	Controllable Opex	104.46	101.07	105.04	111.16	118.66	138.97	124.72	123.15	927.24
SO	**TOTEX**	**145.50**	**144.91**	**147.64**	**168.55**	**180.74**	**217.24**	**184.81**	**168.45**	**1,357.85**
		1,680.43	**1,297.40**	**1,386.04**	**1,327.71**	**1,247.72**	**1,386.48**	**1,699.32**	**1,697.48**	**11,722.60**

2.4 (a) Total Allowances (£m, 2017/18 Prices)		RII0-T1 Allowances								
		2014	2015	2016	2017	2018	2019	2020	2021	Total
TO	Load Related Capex	1,143.87	827.88	553.83	400.53	176.20	234.04	265.22	319.91	3,921.48
	Asset Replacement Capex	597.31	591.25	584.77	588.89	761.14	885.44	745.95	643.90	5,398.65
	Other Capex	33.52	42.33	29.74	60.38	79.61	85.07	153.95	134.03	618.63
	Non-Operational Capex	36.31	35.54	25.69	23.81	22.06	12.91	16.70	15.23	188.26
	Total Capex	**1,811.02**	**1,497.00**	**1,194.03**	**1,073.60**	**1,039.02**	**1,217.45**	**1,181.82**	**1,113.07**	**10,127.02**
	Total Controllable Opex	**245.13**	**250.48**	**259.99**	**262.53**	**264.61**	**265.64**	**268.29**	**269.09**	**2,085.75**
TO	**TOTEX**	**2,056.15**	**1,747.48**	**1,454.02**	**1,336.13**	**1,303.63**	**1,483.09**	**1,450.11**	**1,382.16**	**12,212.77**
SO	**Non-Operational Capex**	66.44	47.87	44.30	44.53	54.43	68.21	49.66	42.31	417.76
	Controllable Opex	**94.43**	**99.42**	**108.98**	**114.31**	**118.92**	**139.21**	**126.43**	**130.70**	**932.41**
SO	**TOTEX**	**160.88**	**147.29**	**153.28**	**158.84**	**173.35**	**207.43**	**176.09**	**173.01**	**1,350.17**
		2,217.02	**1,894.77**	**1,607.30**	**1,494.98**	**1,476.98**	**1,690.52**	**1,626.19**	**1,555.18**	**13,562.94**

2.4 (a) Variance Actual/Forecast v Allowances (£m, 2017/18 Prices)		Variance to Allowance								
		2014	2015	2016	2017	2018	2019	2020	2021	Total
TO	Load Related Capex	421.06	270.52	43.23	20.18	-80.60	29.70	-71.71	-40.65	591.73
	Asset Replacement Capex	316.97	389.10	352.88	268.45	406.27	526.69	361.35	227.53	2,849.25
	Other Capex	-197.31	-32.37	-133.75	-77.43	-60.12	-186.93	-315.11	-338.16	-1,341.17
	Non-Operational Capex	-2.42	4.66	-14.30	-28.47	-17.09	-35.61	-26.60	-8.73	-128.56
	Total Capex	**538.30**	**631.92**	**248.07**	**182.74**	**248.45**	**333.85**	**-52.07**	**-160.01**	**1,971.26**
	Total Controllable Opex	**-17.08**	**-36.93**	**-32.46**	**-5.77**	**-11.81**	**-20.00**	**-12.34**	**13.14**	**-123.23**
	TOTEX	**521.22**	**594.99**	**215.61**	**176.97**	**236.65**	**313.85**	**-64.41**	**-146.87**	**1,848.02**
SO	**Non-Operational Capex**	25.40	4.02	1.71	-12.86	-7.65	-10.05	-10.43	-2.99	-12.85
	Controllable Opex	**-10.03**	**-1.65**	**3.93**	**3.16**	**0.26**	**0.24**	**1.71**	**7.55**	**5.17**
SO	**TOTEX**	**15.37**	**2.37**	**5.64**	**-9.71**	**-7.39**	**-9.81**	**-8.72**	**4.56**	**-7.68**
		536.60	**597.37**	**221.25**	**167.26**	**229.26**	**304.04**	**-73.13**	**-142.30**	**1,840.34**

[5]Capex is broadly the costs incurred in building new assets and replacing existing ones. Opex is broadly the costs incurred for maintaining the assets and running the National Grid business.

[6]This figure is after alignment of allowance categorisation to be consistent with treatment of spend.

Return on Regulatory Equity

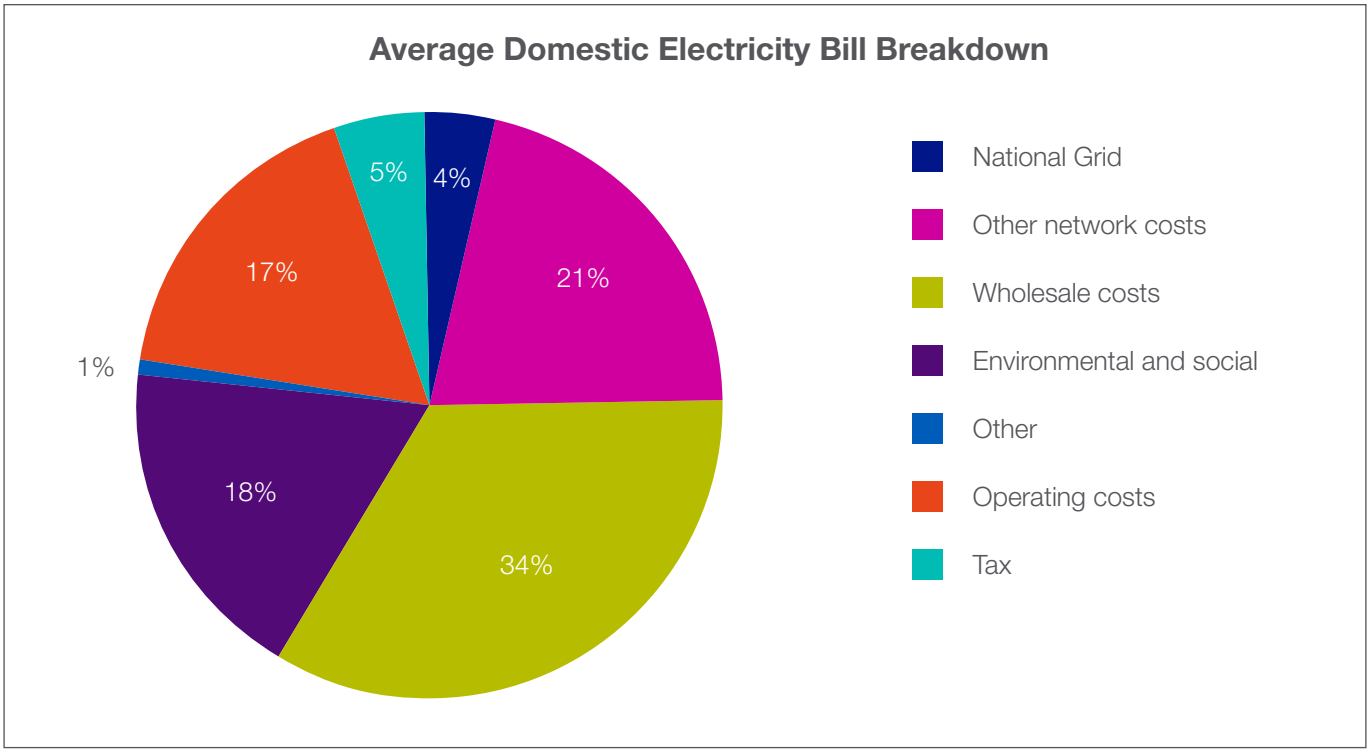
Our performance against allowances, as well as against the various incentive regimes which form part of the RIIO-T1 framework, contribute to one of the measures of performance that Ofgem uses to help understand the performance of regulated networks: Return on Regulated Equity (RoRE). Based on our RRP17 report Ofgem forecast our eight-year average RoRE to be 9.28% for the Electricity TO. We have used Ofgem's approach to calculate an updated RoRE figure for this year of 9.55%. The increase in RoRE of 0.27% reflects the increased difference between allowances and expenditure that we are reporting this year. As noted however this number will remain subject to external factors (e.g. timing of customer driven projects) and the impact of the anticipated adjustment to allowances for the Western HVDC Link to reflect the removal of any timing benefit arising from the delay to this project.

Customer bill – how RIIO revenue affects the domestic electricity bill

So, what does this mean for the end consumer? Our revenues are collected through charging our customers for the services we provide. These network costs for both transmission and distribution make up about 25% of the domestic electricity bill that consumers receive from their supply company.[7] Of this total bill just 4% is attributed to our TO and SO costs, about 50p per week per household for over £8.5bn of investment in the electricity network.

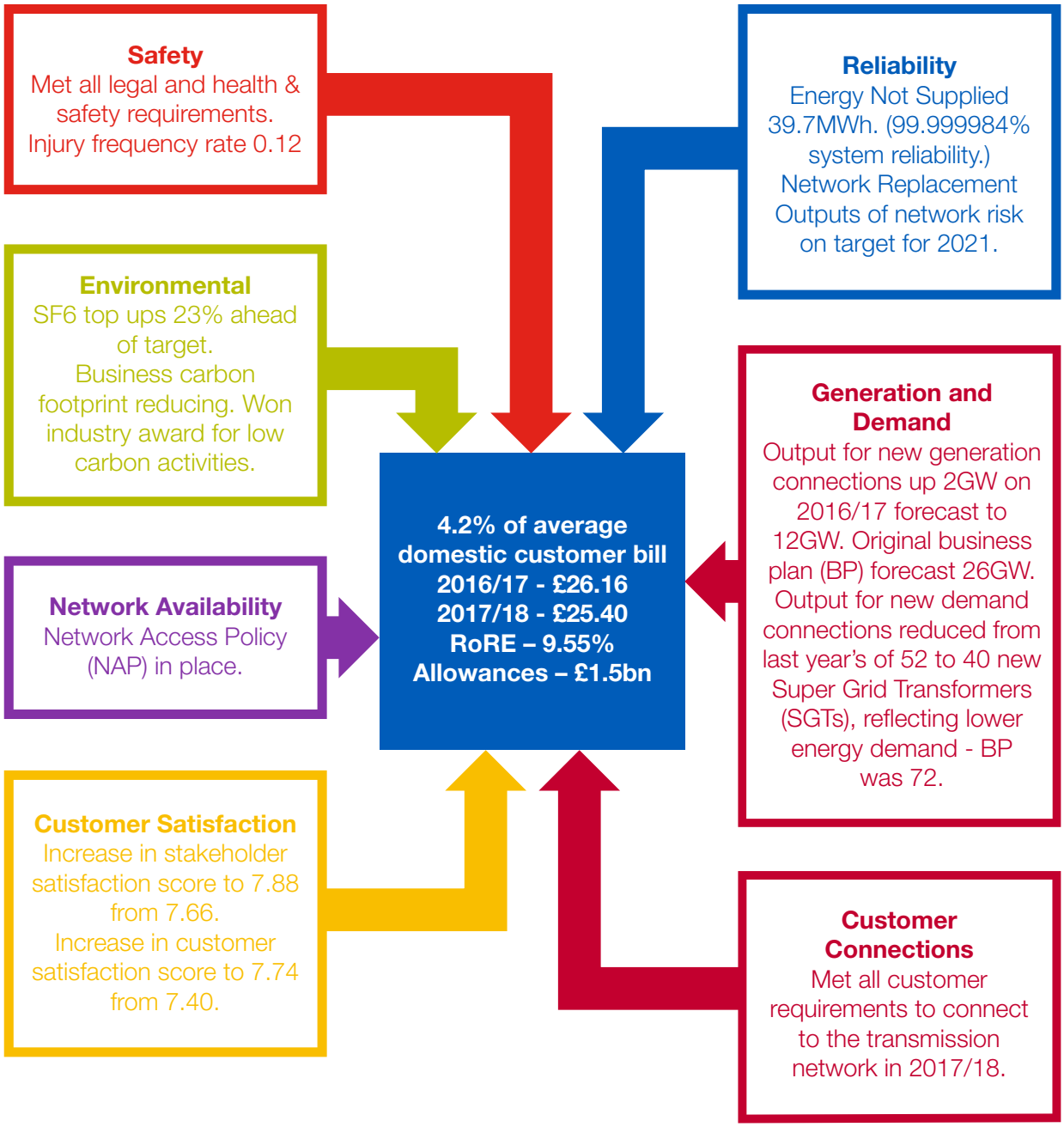
At the start of RIIO-T1 we forecast that the average impact of our networks costs was to be over £26 of the average annual domestic electricity bill. Now we are forecasting that the average impact over the 8 years of RIIO is £24.75. This is because the forecasts have been updated to reflect the changes to our plans and the savings that we are delivering. In 2017/18, we estimate that the average domestic consumer paid £25.40 in network costs attributable to National Grid TO and internal SO costs, a £2 per consumer saving compared with the original forecast for 2017/18.

The customer bill infographic below shows the cost of the different parts that make up the average domestic electricity bill. As mentioned above, only a small element of the network costs are attributed to National Grid, the majority is the cost of the distribution system.



[7]Overall network costs account for approximately 25% of the domestic electricity bill, over 20% of which is distribution network costs not transmission. Source *https://www.ofgem.gov.uk/information-consumers/domestic-consumers/understanding-energy-bills*

Outputs at a glance



How to contact us and other useful links

If you have questions or opinions on this performance summary, please get in touch with us:

by emailing us at talkingnetworkstranmission@nationalgrid.com or using the feedback link on our Talking Networks website *www.talkingnetworkstx.com.*

To find out more about customer bills and the impact of network costs, visit *www.ofgem.gov.uk/information-consumers/domestic-consumers/understanding-energy-bills*

For information on our Innovation activities, visit *www2.nationalgrid.com/uk/our-company/innovation*

To read about our stakeholder engagement, plans and timetable for the RIIO-T2 price control, visit *http://yourenergyfuture.nationalgrid.com/*

To find out more about our electricity business and the market we operate in, visit *http://media.nationalgrid.com/factsheets/*

For further information on our financial performance, visit our dedicated website at *http://investors.nationalgrid.com/*

Legal disclaimer

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These statements include information with respect to National Grid plc's financial condition, its results of operations and businesses, strategy, plans and objectives. Words such as 'anticipates', 'expects', 'should', 'intends', 'plans', 'believes', 'outlook', 'seeks', 'estimates', 'targets', 'may', 'will', 'continue', 'project' and similar expressions, as well as statements in the future tense, identify forward-looking statements.

Furthermore, this document, which is provided for information only, does not constitute summary financial statements and does not contain sufficient information to allow for as full an understanding of the results and state of affairs of National Grid plc and its subsidiaries, including the principal risks and uncertainties facing National Grid plc, as would be provided by the full Annual Report and Accounts, including in particular the Strategic Report section and the 'Risk factors' on pages 173 to 176 of National Grid plc's latest Annual Report and Accounts. Copies of the most recent Annual Report and Accounts are available online at *www2.nationalgrid.com* or from Capita Registrars. Except as may be required by law or regulation, National Grid plc undertakes no obligation to update any of its forward-looking statements, which speak only as of the date of this document. The content of any website references herein does not form part of this document.

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