We have redacted the names of suppliers and associated costs from this version of our application due to the commercially confidential nature of that information.

Northern Powergrid ED2 Storm Arwen reopener submission

SUMMARY

- **Northern Powergrid is requesting £34.7m to improve the resilience of its network in some of the most exposed areas with the most isolated customers, enable faster reconnaissance, enhance the support offered to impacted communities and improve the customer experience when providing compensation after an event.**
- Northern Powergrid has already funded a number of significant improvements in its storm response in line with the Storm Arwen Recommendations so that during severe weather events, customers can access the information and support that they need, when they need it.
  - In 2022, it invested in new website and telephony platforms to replace the platforms that failed to cope during Storm Arwen. The new platforms have been tested and are able to accommodate volumes far more than those seen during Storm Arwen.
  - Northern Powergrid has expanded its call taker population across the organisation and overhauled its communication strategy.
- This reopener application covers the costs of actions agreed on or after 1 December 2021 or further action that could be taken in RIIO-ED2 to respond to the recommendations made by the joint Ofgem and the Department for Energy Security and Net Zero (formerly Department for Business, Energy and Industrial Strategy) review that followed Storm Arwen.
- These actions are grouped into four initiatives, which together require funding of £34.7m over the course of RIIO-ED2:
  1. Increasing overhead line resilience on the highest risk circuits.
  2. Improving intelligence and response coordination through:
     - Mobile Incident Command Facilities, and
     - Reconnaissance by Unmanned Aerial Vehicle.
  3. Making greater use of mobile generation.
  4. Enhanced customer care, including:
     - Large-scale warm food catering contracts,
     - Upgraded welfare provisions, and
     - Faster, electronically enabled payment processes.
- The final RIIO-ED2 business plans were submitted during Storm Arwen. As such, the business plans, and therefore the cost allowances for the RIIO-ED2 period, do not cover the activities associated with delivering the improvements made to storm response during the 2021-22 winter storms period or required by the Storm Arwen Recommendations.
- The initiatives here will be delivered primarily through competitively tendered contracts ensuring value for money for consumers.
- This reopener application meets all the requirements of Special Condition 3.2 Part J, of Northeast's and Yorkshire's RIIO-ED2 licences.

Proposition-on-a-page

Northern Powergrid initiatives *(£m, 2020/21 prices)*		ED2 total
1	**Improving intelligence and response coordination** – *Locating our incident response leadership in the heart of an incident and improving our ability to gather information quickly, and safely, allowing us to better determine the appropriate and quickest course of action for the communities we serve.*	**0.73**
	Including: • Purchasing 2 mobile command units. • Investing in 50 Unmanned arial vehicles for reconnaissance.	
2	**Making greater use of generation** – *Expanding, diversifying and improving our generation fleet to allow us to reconnect a broader range of customers more quickly during an event while seeking to increasingly utilise low-carbon and silent generation options.*	**2.69**
	Including: • Deploying 100 mobile generators. • Purchasing 120 portable battery packs. • Investing in green generation with a further 3 'Silent Power' vehicles and 3 trailers. • Securing 7 additional ring-fenced generators for resilient hubs.	
3	**Enhancing customer care** – *Improving our welfare support for customers affected by power cuts during a storm and speeding up compensation and reimbursement payments.*	**1.31**
	Including: • Investing in improvements to our customer facing systems to make it easier to claim compensation. • Establishing a new electronic payment mechanism. • Providing warm food for around 14,000 storm-affected customers per. • Distributing 5,000 enhanced welfare support packs during power cuts.	
4	**Increasing overhead line resilience** – *Improving the resilience of the network in some of the most exposed regions with isolated communities, through improving robustness of the infrastructure, improved ability to restore customers and providing interconnection with neighbouring network companies.*	**30.05**
	Including: • Upgrading 137 of our highest risk High Voltage feeder sections supplying 64,000 customers. • Utilising interconnection at 8 locations with neighbouring network companies in the highest risk locations. • Converting 42km of LV overhead line to a more resilient conductor type. • Undergrounding almost 67km of overhead lines.	

Total	**34.79**
Adjustments for Ongoing Efficiencies (OE) and Real Price Effects (RPE)	(0.07)
Total Post OE&RPE	**34.72**

Contents

1. Introduction

1. On 26 November 2021 Storm Arwen hit the UK, bringing widespread disruption and resulting in over one million customers losing power nationwide. The most severe impacts were felt in the North, where windspeeds of around 100mph and severe low temperatures led to ice loading on overhead lines. The worst of the adverse weather persisted for almost three days, causing significant damage to the network, particularly in the Northeast, and significant travel disruption. The damage to Northern Powergrid's network caused power cuts to almost 280,000 customers, with a number remaining without power for 11 days during wintery conditions while repairs we completed.

2. Following the Storm both Ofgem and the Department for Energy Security and Net Zero ("DESNZ", formerly "BEIS") carried out investigations into the response of the network companies. The outcome of the review was a series of actions intended to improve the industry's response (Storm Arwen Recommendations).[1]

3. It was during Storm Arwen that the final drafts of RIIO-ED2 business plan were submitted. As such, RIIO-ED2 business plans did not include the actions and costs associated with improvements to storm response implemented during the 2021-22 winter storms period or the costs associated with actions resulting from the Storm Arwen Recommendations. Therefore, Northern Powergrid's allowances for the RIIO-ED2 period (2023-28) do not account for these costs.

4. The Gas and Electricity Markets Authority ("GEMA" or the "Authority") provided a mechanism to recover the costs associated with these actions through the opportunity to trigger a cost reopener in January 2024. This notice sets out the funding requests for both Northern Powergrid (Northeast) plc ("Northeast") and Northern Powergrid (Yorkshire) plc ("Yorkshire"), together "Northern Powergrid" or "NPg".

2. Regulatory requirements

5. This document constitutes a notification by Northern Powergrid to GEMA under the provisions of electricity distribution licence Special Condition 3.2 Uncertain Cost Re-openers ("SpC 3.2") Part J, proposing an adjustment to the level of allowed expenditure in respect of Storm Arwen (SAR_t).

6. Northern Powergrid provides this notification on behalf of its two licensees, Northeast and Yorkshire.

7. This reopener application meets all the requirements of Special Condition 3.2 Part J, of Northeast's and Yorkshire's RIIO-ED2 licences. These requirements are confined to costs:

[1] "Storm Arwen Recommendations" means the recommendations made (a) by the Authority, published in the document titled "Final report on the review into the networks' response to Storm Arwen" published on 9 June 2022; and (b) by the Energy Emergencies Executive in the document titled "Energy Emergencies Executive Committee Storm Arwen Review" published on 9 June 2022.

- incurred or expected to be incurred by Northern Powergrid's distribution businesses that have changed, or are expected to change, as a direct result of the Storm Arwen Recommendations, including actions taken as a result of those recommendations.
- relating to changes agreed on or after 1 December 2021
- incurred or expected to be incurred on or after 1 April 2023; and
- that take account of other allowed expenditure that could be avoided or reduced as a result of the actions taken in response to the Storm Arwen Recommendations.

8. In Section 4 of this document, we set out actions that we have taken that will incur ongoing costs during the RIIO-ED2 period or actions that we are proposing in response to the Storm Arwen Recommendations. We have set out the changes to the way in which Northern Powergrid operates or will operate its distribution business and the associated costs. We have grouped these actions into initiatives and each initiative has a discrete table that sets out the details of the actions taken or the actions proposed including identification of which Storm Arwen Recommendations the actions satisfy. Annex B provides a summary of the mapping of Storm Arwen Recommendations to the initiatives.

9. In addition to the reopener application document, we have provided detailed justification in the form of an engineering justification paper (EJP) for the Enhancing Overhead Line Resilience on Highest Risk Customer Circuits initiative and a Storm Arwen Cost Benefit Analysis.

10. The proposed base adjustment to allowances, including the years to which it relates, is set out in the table below.

Table 1: proposed adjustments to base allowances (£m, 2020/21 prices)

	23/24	24/25	25/26	26/27	27/28	**Total**
Northeast	0.21	0.35	2.47	12.76	12.76	**28.55**
Yorkshire	0.21	0.25	1.55	2.08	2.08	**6.16**
Northern Powergrid						**34.72**

3. Stakeholder engagement

11. We have engaged consistently across our region over the last two years with regard to Storm Arwen. Early engagement focussed on hearing from our customers following the storm to inform our major incident response improvement programme launched in 2022. We then engaged to provide updates against that plan and then more recently our engagement has focussed on the development of the Storm Arwen reopener application.

12. In the development of the reopener application, we have also worked with two other DNOs, Electricity North West ("ENWL") and Scottish Power ("SPEN"), to develop proposals for interconnection between our networks to improve the resilience in some of the more remote and isolated areas at the far end of our networks.

Town Hall Meetings

13. Stakeholder engagement relating to improvements following Storm Arwen began in January 2022 as we held a series of Community Meetings alongside MPs with their constituents in the worst affected areas during the storms.

14. The events were attended by customers, Local Authorities, Councillors, Local Resilience Forums and members of parliament and provided an opportunity to discuss the storm events and hear from those gathered about our performance. We were also able to discuss the improvements made in our storm response programme as well as to hear suggestions for further improvements.

15. We received feedback that covered all aspects of our storm response, with particularly strong themes around:

- **Network resilience**: We were challenged about the form and construction of our network in rural areas. This mainly focussed on the reasoning behind the use of overhead lines rather than underground cables as well as the strength and construction of overhead line supports, especially wooden poles, in exposed regions like the ones affected.
- **Generation**: Customers challenged us to make greater us of generation to connect both homes and communities so that even if network repairs are protracted, customers and businesses have power.
- **Communications**: Both our website and telephony platforms failed due to the volume of traffic, so unsurprisingly customers challenged us to improve both our communications infrastructure and our communications strategy. Customers were clear that changing restoration times were unhelpful and that customers sought more than just website and text message updates, valuing personal contact in their locality.
- **Welfare support**: Customers were isolated and, while they appreciated the support we offered and the way our offer improved throughout the event, they challenged us to do more, including better provision of warm meals and support for warm hubs.
- **Compensation**: We were frequently challenged about the speed of our compensation process. We had never carried out an exercise of that size and the processes for making the payments, and the mechanisms we were authorised to use, meant that the process was slow and customers were unhappy with it.
- **Broader infrastructure impact**: The storm-related power cuts also left some customers without water, as pumping stations were without power, and without mobile and broadband access as cell towers were without power and backup power failed or ran out.

16. We also ran an engagement program with regional MPs in Westminster, one each for Yorkshire and Northeast. These were well attended events where we heard from MPs about the challenges faced in their constituencies and we heard their thoughts on improvements that could make the most difference. These were consistent with the themes set out above.

17. These themes are reflective of the Storm Arwen Recommendations and informed the development of the initiatives set out later in this document.

Reopener workshops

18. During October and November 2023, we held nine bilateral meetings with Local Authorities, Local Resilience Forums, and water and telecommunications companies to discuss the improvement priorities, focussing mainly on the investment in network infrastructure. The purpose was to seek feedback on the high-risk areas of our network to help shape our proposals prioritisation and identify additional areas that should be considered.

19. Each stakeholder engagement session involved an explanation of the Storm Arwen Reopener submission, what it entails and the potential for enhanced resilience. We explained our overall strategy and the process driving the selection of high-risk customer areas. As part of each session, we looked to obtain information from each party which we could integrate into our optioneering process.

20. For Local Authorities and Local Resilience Forums, we provided questionnaires which aimed to better understand any isolation, deprivation, communication and transport issues in the communities served by the high-risk feeders. We also sought information on the impact of weather on the communities identified, vulnerability of the communities, community hub availability, receptiveness to disruption that may be caused by the network upgrades and what modifications are required to improve network resilience, and what we can do to improve welfare support. This then helped us identify and prioritise the highest risk communities as advised in the Energy Emergencies Executive Committee (E3C) Storm Arwen Review Final Report[2].

21. In addition to the meetings, Local Authorities were asked to fill in questionnaires for each of the postcode areas identified within their region and provide a priority ranking of the areas identified.

22. The Northern Powergrid Independent Stakeholder Group (“ISG”, formally “CEG”) was also involved in these sessions as well as more broadly reviewing initiatives proposed and offering challenge throughout the development of this application.

Water and Telecoms

23. For water and telecoms companies, we wanted to understand what critical sites are located within the high-risk areas and the resilience they have in place, so that this can also be considered when prioritising investment on the identified feeders.

[2] Energy Emergencies Executive Committee Storm Arwen Review Final Report, (E3C) June 2022.

24. The E3C report highlights the importance of identifying Secondary Impacts[3] of power cuts, referring to impacts on other essential services for which power is a key dependency. The report highlights three sectors that require attention, these are Telecommunications, Emergency Services and Water.

25. For Telecommunications it is important to consider the interdependence between the energy and communications sector. This is essential for maintaining communication with customers to keep them informed during power outages as well as supporting Northern Powergrid communications in impacted areas to assist with restoration activities.

26. For emergency services the Airwave Network was impacted substantially; there were 1,053 incidents on their network, of which 636 were primarily caused by power outages[4].

27. Water utilities were heavily impacted, particularly sites that lacked back-up electricity supplies. Water utilities pose a multiplier effect in the disruption to customers from power outages; a water pumping station appears as a single customer on Northern Powergrid's records, but loss of power to the site has the potential to cause disruption for thousands of customers in both local and remote communities.

28. The E3C report also highlights the importance of identifying 'High Risk Communities'[5]. These are communities deemed to suffer disproportionately from the loss of the aforementioned essential services. Loss of these services is exacerbated where communities are remote and rural. Rural and coastal areas for instance often have less overlap of mobile phone cell sites making them more vulnerable.

29. Any interventions to enhance resilience on our network must therefore be cognisant of the impact on these sectors and identify and prioritise higher risk communities. Following the workshops, the water and telecoms companies sent through data on their critical sites that we have built into our models to inform our proposals.

Whole System Planning

30. We have also been proactive in exploring opportunities for cross-DNO collaboration to improve resilience on the network. We have engaged with two other DNOs, ENWL and SPEN. Both DNOs share borders with our region, along the Pennines and Scottish Borders, and were significantly impacted by Storm Arwen.

31. Together we carried out a high-level feasibility assessment to identify candidates for cross-DNO high voltage ("HV") interconnection. We agreed a shortlist of candidates between NPg and the other DNOs where an interconnector would be beneficial for at least one of the two DNOs.

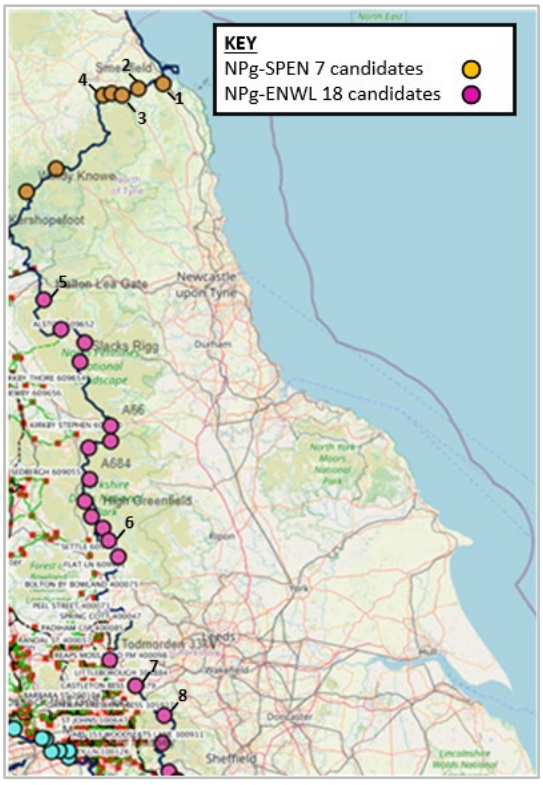
32. The initiative for cross-DNO interconnectors serves to improve resilience on HV feeders which are at higher altitudes and at the periphery of our region. By nature of being on the boundary of our

[3] Energy Emergencies Executive Committee Storm Arwen Review Final Report, (E3C) June 2022, Page 19
[4] "Energy Emergencies Executive Committee Storm Arwen Review Final Report",(E3C) June 2022, Page 20
[5] "Energy Emergencies Executive Committee Storm Arwen Review Final Report",(E3C) June 2022, Page 21

region these feeders often are comprised of long spurs, supplying remote customers and involve substantial mobilisation time for repairs following a fault. The higher altitudes also present more adverse weather conditions, putting these overhead lines ("OHL") at higher risk of failure under storm conditions. In light of this, where the benefit can be demonstrated, it serves to have a unified approach between DNOs to strengthen resilience through interconnection.

33. This is a novel approach to improving resilience as historically DNO would only look for interconnection opportunities within their own network areas. Due to the sparse nature of the network topography and low population density in these geographic areas, these interconnection opportunities have been limited and are often economically inefficient to develop. Taking a wider approach across network operators unlocks more opportunities to look for interconnection options that would be economic when compared to the customer impact of being off supply for several days.

34. We initially identified 25 potential cross DNO interconnector candidates, NPg:SPEN (7 candidates) and NPg: ENWL (18 candidates), as illustrated in the map below.



35. The shortlist of HV interconnection candidates has been developed based on desktop studies. Post submission the candidates will be subject to site surveys to develop the solutions and work with local landowners. Through coordination with the other DNOs we have discussed the solutions to a sufficient level to facilitate costing and have agreed that each DNO will be liable for 50% of the cost of an interconnector. Each DNO will fully fund any upstream reinforcement required on their network to provide the required capacity.

4. Optioneering approach

36. This section briefly sets out the high-level approach to optioneering. The options review for each of the proposed initiatives is set out in the relevant table in section five below.

37. This application is for a small but focussed set of initiatives that will improve our ability to respond to major incidents as well as improving the service and care we provide to our customers during those incidents.

38. Two years' of stakeholder engagement have helped us refine our approach such that this application reflects proposals stemming from the Storm Arwen Recommendations that have been refined through conversation with our customers and stakeholders, and reflect cost efficiency considerations.

39. We did consider a broader range of initiatives but discounted them as we processed the application. These included:

- **Providing customer mobile connectivity:** During Storm Arwen, and in subsequent storms, customer mobile signal and broadband can be disrupted if the cell masts power fails. We explored purchasing some 'cell on wheels' (COW) devices that we could take to an affected area and provide some measure of access.

  However, as we reviewed this technology, we found that it would only allow access for customers of certain mobile networks and each device would incur a £10,000 call out fee when used. While we believe there is merit in this technology, we do not believe it is ready for what we would want to use it for and as such it is not a suitable proposal for this application.

  An alternative was a Wi-Fi only version, which was less restrictive but could not accommodate customers at scale.

  As we considered the cost benefit of these options we discounted them, especially when in the first instance it should be the duty of mobile providers to have resilience measures and back up support in place.

- **Improving our ability to issue and install overhead line poles**. We reviewed options for improved storage facilities relating to overhead line poles that would allow us to locate them securely around our region, alongside new specialist vehicles that would improve our ability to remove and install poles quickly.

  While these are things that we will explore as future investments, we discounted them from this application as we felt that they are not actions taken as a direct result of the Storm Arwen Recommendations.

- **Improvements to our storm data capabilities**. We considered a range of improvements to our systems and process with regard to real-time data integration that would allow for

faster analytics and communications or improving field capture technology to improve reconnaissance and data gathering.

As we reviewed this initiative, we identified either overlap with our digitalisation strategy and action plan or we found that they are not actions taken as a direct result of the Storm Arwen Recommendations. We will continue to pursue these activities through our digitalisation plans.

40. We also adopted a proportionate approach, considering customer benefit and deliverability. Of the £34.79m that we are applying for, £30.05m of it is associated with an initiative targeted at improving our overhead line resilience in certain areas of our network. Given the scale of this initiative, we have produced a detailed Engineering Justification Paper to accompany this submission. The EJP details the optioneering undertaken, considering a range of investments against the associated customer benefits, and the assessment carried out for that initiative. Rather than replicating the EJP in this document, we have briefly summarised it in section 5.

41. For each initiative in this reopener application, there is the option of doing nothing or delaying investment until RIIO-ED3. However, we do not believe that is the appropriate or required response to the Storm Arwen Recommendations, or in the best interest of our customers.

5. Initiatives identified to deliver improvements

42. In this section of the document, we step through each initiative identified to deliver improvements in line with the Storm Arwen Recommendations, individually stating the costs we are looking to recover or investment we're seeking to make, why we are proposing them and how we have considered the options.

43. Following Storm Arwen and receipt of the Storm Arwen Recommendations, we established an ongoing major incident response improvement programme that is designed to drive continuous improvement across all aspects of our major incident response. This programme has included actions ranging from internal process improvements, the creation of new communications strategies, the establishment of welfare support provision and compensation arrangements, up to bringing forward of planned investment in telephony platforms and website resilience.

44. This programme has driven significant improvement in our operations over the last two years and has also identified areas where improvement is required in response to the Storm Arwen Recommendations.

45. This reopener application seeks to recover some of the costs of the changes we made in the immediate response to Storm Arwen, that will incur costs beyond 1 April 2023, and sets out proposed investment to further improve our operational response and network resilience in line with the Storm Arwen Recommendations in accordance with the reopener criteria.

46. The actions that we have taken or that we are proposing can be split into four initiatives:

- Improving intelligence and response coordination
- Making greater use of mobile generation
- Enhancing customer care
- Increasing overhead line resilience on highest risk circuits

47. Table 1 below provides a high-level overview of the initiatives and their costs. Each initiative is then tabulated, stepping through the necessary considerations associated with that proposal and Ofgem's assessment criteria.

Table 2: Summary of NPg Storm Arwen Initiatives

	Summary of proposed initiatives		Value (£m)	Storm Arwen Recommendations
#	Type	Initiative		
1	*New investment*	Improving intelligence and response coordination	0.73	R1, O6, [R3]
2	*New investment*	Making greater use of mobile generation	2.69	R2, R5a, O8
3	*Cost recovery and new investment*	Enhancing customer care	1.31	WF1, WF2, WF3, WF4, CP1, CP2, CP3, O18
4	*New investment*	Enhancing overhead line resilience on highest risk circuits	30.05	E2, R1, R5, O1, O6, O7
		Total	**34.79**	

1. IMPROVING INTELLIGENCE AND RESPONSE COORDINATION | £0.73m

Summary

We propose to invest in the capability to establish remote command posts during major incidents and increase our Unmanned Arial Vehicle fleet to improve and speed up network damage reconnaissance.

During major incidents, gaining timely intelligence on the situation as it unfolds is often one of the key challenges; the quicker that we are able to understand the impact of an event, the more effective our response – both in terms of our restoration efforts and how we communicate with our customers. During particularly severe storms where a weather front remains for a longer duration – like Storm Arwen – gathering that information is even more difficult as weather conditions restrict our abilities to gather information.

We have programmes of investment in our plan to improve the intelligence provided through monitoring on our network and we will continue to utilise traditional means of reconnaissance such foot patrols of our network and draw on helicopter patrols when we are able during major incidents. This initiative is an incremental build on that.

We propose to purchase two vehicles that will allow us to readily establish mobile command posts that we can deploy to the heart of the worst affected areas during an event. Having implemented similar solutions during Storm Arwen, albeit in a third-party building with limited IT infrastructure, we have found it improves our ability to understand the impact of an event and therefore affects our response time, as well as improving our support to the local communities.

We are also proposing to invest an Unmanned Arial Vehicle ("UAV") fleet to improve the speed of our reconnaissance and damage assessment, as well as enhancing our ability to gather that information safely.

Need for investment

- During major incidents, gaining timely intelligence on the situation as it unfolds is one of the key challenges. One of the earliest Storm Arwen Recommendations to materialise during the review was the need for network companies to improve their ability to quickly assess the extent of the damage that the network was sustaining during a major incident.
- The nature of Storm Arwen – both the type of weather and the extended period that it continued to impact our region – served to highlight this issue as assessing the extent of the damage sustained was a significant problem. This meant that for a number of days we were unable to assess the amount of work required to restore the network and we were unable to communicate as effectively as we would have liked with our customers.
- Once we were able to assess the damage, we identified the need to establish a remote command post in the heart of the worst affected area, focussed solely on the repair effort required in that area. This meant that we were able to effectively operate a very targeted command for the worst affected area with assigned resources, allowing this to operate as a nested major incident command within the overall major incident command structure.
- We were able to establish a makeshift station in a community hall nearby which, despite limited IT and Telecoms infrastructure, proved to be an effective staging post for us to run our operations out of as well as an effective point of contact for our customers and resilience partners.
- Having this capability, plus the necessary IT and Telecoms infrastructure, available to us in any event, in any location, whether utilising it to act as the major incident command centre, or for it to operate as a nested remote command point focussed on the worst affected areas in an

event, would be a significant step forward in our major incident response. This is a major incident solution used effectively in other industry sectors and the emergency services.

- Similarly, the extent of the damage following the events meant that utilising foot patrols for reconnaissance was slow, restricted and potentially dangerous for our people. As such we identified the need to expand our use of the technology available to improve our ability to patrol our network quickly and safely.
- The 2021-22 winter storm season coincided with submission of the final RIIO-ED2 business plan. This meant that we were unable to reflect this learning from the winter storms or the Storm Arwen Recommendations in our RIIO-ED2 business plan, therefore our RIIO-ED2 allowances do not provide for this new initiative. We have included consideration of the impact of this initiative on other costs and activities in the relevant table in section 5.

Alignment with Storm Arwen Recommendations

- **R1 -** E3C to review and update industry best practice to ensure DNOs can quickly identify faults and safely assess the extent of network damage earlier in a severe weather event. This review should include the role of smart meter data and technology for this task.
- **CM5 -** Northern Powergrid to ensure their customer communication strategies take into consideration the impact of inaccurate, uncertain and changing messaging.

Optioneering

Utilise community and third-party properties.

- We could continue with the aspiration of a local leadership presence during a severe weather incident but draw on community and third-party properties, like community centres, village halls and churches.
- However, as we have experienced, these properties are not equipped with the connectivity and power requirements (quite literally the number of plug sockets) required to support a base of operations. We would be a drain on the resources of the community rather than providing additional support.

Increase foot patrol resource.

- During severe weather incidents, a number of our non-operational colleagues perform a 'storm duty' as a 'front-runner'. This amounts to these members of staff patrolling overhead lines in areas where we believe there is a fault and reporting back what they find. This has proven to be a valuable resource. We could train more of our non-operational colleagues to perform this duty during storms.
- However, this is a relatively slow process and involves our colleagues walking across challenging terrain in difficult and dangerous conditions. The only benefit over and above the use of a UAV is the ability of a human to perform a physical inspection of a pole if that is necessary or there is landowner objection due to animals.

Invest in mobile command vehicles in RIIO-ED2

- We could invest in two mobile command vehicles, fitted with the technology to allow them to act as a remote office as well as provide some basic welfare support (warm drinks, connectivity, mobile phone charging).
- These would allow us to locate our event command team in the heart of a community, without drawing on that communities resources, and coordinate the activity from that location.

Invest in UAVs for reconnaissance and damage assessment in RIIO-ED2

- We could invest in 50 Unmanned Arial Vehicles (UAVs) that we can divide up across our region and teams to allow us to patrol our overhead line network quickly and efficiently following a storm and gather damage information to inform our repairs activity.

Proposed Option

- We propose to invest in mobile command vehicles and UAVs.
- While the first two options would provide some benefit, they are not the optimal solution and carry the inherent risks that we either become a burden on the communities we're seeking to help or we look to put a greater number of our colleagues at risk during foot patrols.
- The proposals enable us to position ourselves in the heart of an incident, improve our ability to gather information quickly, and safely, allowing us to better determine the appropriate and quickest course of action for the communities we serve.

1.a. Invest in mobile command vehicles in RIIO-ED2

- In Storm Arwen the villages of Stanhope, Eastgate and Westgate in Weardale, County Durham were severely impacted. Due to the scale of the damage in that area we established a local command post at St John's Chapel near Eastgate.
- This command post proved highly effective as it served a number of purposes, acting as an operational hub that coordinated the network repairs efforts in the region as well as a staging post for welfare support and customers communications.
- We were fortunate in this instance to have access to the community building at St John's Chapel to act as this base. However, we cannot always guarantee access to such facilities in all events, the IT and Telecoms infrastructure is not designed to cater for the traffic an operational centre requires. Also, it is better if we are able to locate to the local community and provide additional resources rather than being a drain on their resources.
- Therefore, we propose the purchase of 2 vehicles (1 per licence area) that we can operate as mobile incident command vehicles that allow us to establish an operational hub.
- The 4x4 vehicles would be deployed to epicentres for operational response command. They would be equipped to enable us to handle any incident efficiently and have effective communication within minutes of arriving at a scene. The functionality includes:
  - IT and office equipment
  - Silent running generator
  - Welfare facilities
  - Lighting and communications masts
  - Linked multimedia units
- The vehicles will be fitted with mobile communications systems to link back to corporate systems as well as potentially providing some limited communications/WiFi for customers. We would also be able to offer facilities for customers to warm food, charge phones and get a hot drink.
- This ability, alongside the work done with Local Resilience Partners to establish a list of local resilience hubs, means that we could place the vehicles nearby these hubs to ensure that we can lead the operational response from the site and provide timely information and support to those worst affected customers.

1.b. Invest in UAVs for reconnaissance and damage assessment in RIIO-ED2

- Following Storm Arwen, Barra, Corrie, Dudley, Eunice and Franklin in the 2021-22 winter storm season, the benefits of UAV technology for assessing storm damage were in the spotlight, especially with regard to assessment in remote locations or where access is limited or blocked.
- UAVs can assess damage quickly and pinpoint issues in places where it may be dangerous for people to venture. They can be fitted with infrared and high-zoom sensors allowing operators to undertake detailed inspections of, for example, damage to power lines, overhead line supports and properties including substations. They can also be used to aid with inspection of trees and vegetation encroachment.
- We already make use of drones when carrying out post storm reconnaissance damage assessments, for example in woodland areas which contain fallen or damaged trees. This is in addition to traditional means such as sending out our teams to walk the length of the overhead line to identify a fault.
- The speed with which UAVs are able to cover an overhead line and the detailed information it can gather, means that we are better able to prepare our restoration and repairs teams ahead of arrival on site, improving restoration times.
- It also allows us to gather the information safely, reducing the need for traditional foot patrols in areas with steep or undulating terrain which carry an increased risk of slips, trips or falls for our operational colleagues.
- UAVs must comply with the Civil Aviation Authority ("CAA") regulations on training and licencing pilots, and we have internal cyber security requirements within our procurement processes that limit us to certain UAV manufacturers.
- We propose to purchase UAVs, as this will allow us to provide vehicles to operational staff across our regions and additional non-operational staff who carry out front running reconnaissance roles during a major incident.
-

Benefits

- Faster and safer damage reconnaissance following a major event.
- Improved restoration times due to having more information available to restoration teams ahead of arrival on site.
- Better understanding of the event and the impact on the communities affected.
- Improved incident coordination.
- Improved customer communication and welfare support coordination.
- Potential customer connectivity during an outage.

Deliverability

- We would procure the vehicles through our Vehicle Leasing partner who provides all of our fleet vehicles. We have customer service vans fitted with similar specification. As such procuring two such vehicles would not present a deliverability risk.
- We have explored the commercial arrangements with potential suppliers and discussed delivery milestones which the suppliers can achieve, causing us no concerns with acquiring the vehicles.
- The potential longer lead time relates to training for UAV pilots. However, the lighter UAVs that we are proposing are straightforward devices with simpler licencing requirements meaning that training can be delivered in house by our existing pilots.

2. MAKING GREATER USE OF MOBILE GENERATION | £2.69m

Summary

A key recommendation of the Storm Arwen review was to make greater use of mobile generation during major incidents to improve our ability to rapidly grant temporary power to households and businesses.

We have an existing contract for the provision of generators. We draw on this contract during major events, and did so during Storm Arwen, deploying 354 generators throughout the event.

However, we found that the effectiveness of generator utilisation is affected by certain factors, such as generator type, size and fuel.

Our initiative looks to expand and adapt our ability to utilise generation for the benefit of our customers by increasing both the volume and diversity of our generator fleet while also finding more sustainable options. The solutions include purchasing 120 portable battery units that we can take into customers homes, covering the cost of the lease of 100 'wheelbarrow' generators, purchasing hybrid generators, increasing the fleet of battery generators and securing further generator provision for resilient hubs.

Need for investment

- Our RIIO-ED2 business plan did include costs associated with network resilience and assumptions around major incidents. However, Storm Arwen was such a significant event that it has driven change significant change in our approach to storm response, as it has across the industry.
- The actions taken during the event, and those arising from the post-Storm Arwen reviews, occurred after we had submitted out RIIO-ED2 business plan which meant we were unable to account for the revised assumptions in our submission.
- One of the key areas of interest from government, Ofgem, media, resilience partners and customers was generation and whether we could do more than we currently do.
- This proposal seeks to enable us to increase what we provide in line with the recommendations while balancing costs and effectiveness of our response.

Storm Arwen Recommendations

- **R2:** E3C to identify options to enhance the use of mobile generators in reducing the length of power disruption, covering the population of mobile generators held by the DNOs and resourcing options to transport, install, refuel and remove.
- **O8:** E3C should identify options to enhance the use of mobile generators in reducing the length of power disruptions.
- **R5a:** NEWSAC membership to review and update and expand as required the list of specialist resources and equipment that could be called upon during an emergency response and put in place a process to keep the list updated.

Optioneering

Increase the volumes of existing generators in the RIIO-ED2 period.

- We could work with our generator providers to increase the volume of the existing generator fleet available to us.
- We considered focussing on simply securing more 'wheelbarrow' generators. However, these units are diesel intensive solutions that require specialist resource to connect and require an

ongoing programme to manage fuel levels and deployment. As such, increasing the volume of what is currently available to us could start to become detrimental to our major incident response given the logistics associated refuelling the generators.

- We also considered simply purchasing large scale generators. However, these are expensive and require specialist machinery to deploy them with specialist resource to connect them. The size and scale of the generator and the vehicles to transport it also limit their effectiveness in supporting rural regions, which are the most likely to benefit from generation.
- We believe that increased diversity across our generator fleet allows for targeted, meaningful intervention that will offer greater customer benefits.

Invest to diversify the generation fleet to help a broader range of customers in RIIO-ED2.

- Address identified gaps by increasing our generator provision in line with the Storm Arwen Recommendations and stakeholder feedback while also utilising more sustainable options in our fleet.
- Within this option, each element of the initiative underwent further optioneering to establish the right mix of generator solutions. For instance:
  - For portable batteries we considered purchasing 1,000 portable battery power packs such that we can have enough for one in every vehicle in our fleet as well as back-ups charging ready for use.
  - For Silent Power (a vehicle with a battery generator) we considered the size of the silent power vehicle which determines the number of homes it can power (1-3) as well as whether to purchase silent power trailers or vans.

Proposed option

- We propose investing in RIIO-ED2 to expand our generation fleet but to invest in diversification to allow us to help a broader range of customers while expanding our low-carbon generation options.
- The various elements of this option are set out below.

2.a. Portable battery power packs (small-scale, domestic battery packs)

- We propose purchasing small, lightweight battery packs that are used to provide 12 hours of temporary power for medical equipment (medical compressors and nebulisers) and small household appliances.
- We would deploy these during a major incident, prioritising our PSR customers.
- Due to the battery technology they can be safely stored in our fleet vans and deployed rapidly. There is no fuel requirement and don't require wires or cables connecting to a domestic cut out.
- There are no exhaust or emissions associated with these devices, unlike conventional generators.
- They can run for 12 hours (depending on use) without refuelling. Small diesel generators require refuelling every four hours, which can become a significant overhead during a major event.

2.b. Hybrid generators

- We propose purchasing hybrid generators.
- These are a single unit that can run as a typical generator but also collect and store renewable energy in lithium battery packs converting, it into usable power and feeding it into a property.

- They can collect renewable energy sources such as solar panels, wind turbines or a conventional combustion engine generator.
- These units automatically switch from a conventional engine when the load is low and draw energy from the internal storage battery instead.
- Battery operation provides benefits around energy consumption, extended running time without a refuelling visit, noise reduction and less pollution.
- These units are large, requiring the use of a trailer or crane wagon to move into position. They are capable of generating 8kW of power for homes and businesses.
- Smaller units are available but the lower capacity would limit their effectiveness during power cuts.

2.c. Silent Power vehicles

- These are vehicles (Ford Transit Custom vans) with battery storage that can be driven to a property and connected by any of our staff and provide temporary power for between 1 and 3 properties for 24-48 hours.
- We originally had 3 units in our fleet that could power one property each and they are all based in our West Yorkshire region. We have recently ordered three more units that are larger and can power three properties in total. The Storm Arwen Recommendations are clear, we must look to increase our use of generation. Given the proven effectiveness of this technology, we propose the purchase more units, the same as the larger units, taking us to nine in total.
- We also propose to purchase 3 Silent Power trailer mounted units for use in situations where access requires a 4x4 vehicle which is common in our rural regions. These units can be towed into place by a 4x4, offering the same benefits of silent power vehicles – battery power, silent and pollution free generation, in areas where we previously couldn't access to install these units.

2.d. Overground cables event boxes (Supply Pod)

- We propose the purchase event boxes.
- An event box (Supply Pod) is a weatherproof Glass-fibre Reinforced Polyester (GRP) enclosure that contains pre-wired connections for connecting multiple properties to a single generator without the need to excavate and locate the LV main which feeds the properties.
- The self-contained unit improves our ability to quickly provide temporary power in the event of a power cut as they are robust, easy to transport and quick to connect.
- We considered a larger solution based on the 'PowerStation' recently utilised by Scottish Power. However, based on their feedback the larger solution required a truck to transport the unit meaning that it took too long to deploy and connect the individual properties to it which distracted from the core restoration activity. As such we have discounted this option, opting for a solution that should enhance our existing provision.

2.e. Step-up generators and set up of pre-arranged connection points

- We propose to purchase seven step-up generators that are able to restore power to multiple pole mounted substations by connecting the generator to a transformer which is in turn connected to the HV network at either 11kV or 20kV depending on the location.
- These generators would support improving the resilience of long overhead line feeders which are most susceptible to wind and snow events, reducing the time it takes for us to restore power

in those typically more remote areas. These types of communities were some of the worst affected during Storm Arwen.

- Typically multiple, at times double digit, generators are needed on the LV network to restore these communities. However, this technology allows us to connect a single generator upstream on the HV network meaning we restore supplies more quickly as well as reducing the logistical overhead associated with deploying and maintaining numerous generators.
- These generators can also be used in Business-As-Usual reducing interruptions to customers for planned works.

2.f. Generators for resilient hubs -

- We would purchase an additional 35kVA generators that would be ringfenced in the generator fleet to support resilient hubs across the regions we serve.
- We currently make a small number of generators available for resilient hubs across our service area. In the event of a major incident forecast, we are able to then deploy them to resilient hubs or strategic staging posts in the areas that are likely to be the worst affected during an event, quickly connecting them as required.
- As demonstrated during Storm Arwen, resilient hubs are an effective support for impacted communities, particularly isolated rural communities.
- We would also utilise them during business-as-usual to ensure they are an efficient investment and so that they are well maintained should they need to be called up on to support resilient hubs.
- To allow for easier connection by ensuring there is a readymade connection point for these generators, we propose to install concrete plinths and cabling at the designated sites.
- This capability allows us to quickly establish hubs for affected communities and coordinate our efforts with local resilience partners to ensure customers are aware of the provision ahead of an event.

2.g. Tail lift vans for wheelbarrow generators

- During Storm Arwen we secured access to 100 ‘wheelbarrow’ generators to aid restoration efforts. These generators are smaller units that can be taken to a customer’s premises and connected providing support for a single property.
- At the moment these are transported on the back of existing flatbed vans with tail lifts, which we have identified is the optimal distribution method during an event.
- We propose purchasing 8 all-wheel drive vans with tail lifts, loading and locking rails and lockable auxillary storage that will allow us to break up the shipments into smaller groups that allows for more dynamic deployment and improve our ability to get them to locations that are difficult to access. This will enable us to more quickly restore power to affected customers than we are able to at the moment with these units.

2.h. Wheelbarrow generators

- In response to the Storm Arwen Recommendations we secured ring fenced access to 100 ‘wheelbarrow’ generators via our current mobile generator contract with Generator Power for use in storm response situations.
- During Storm Arwen and the winter storms that followed, Ofgem and Government were clear that they wanted network companies to make greater use generation, resulting in this being

one of the first Storm Arwen Recommendations to crystalise. We agreed to these additional costs in direct response to that instruction.

- Therefore, as per the SLC3.2 Part J, these costs were incurred following changes agreed on or after 1 December 2021 and will incur costs throughout the RIIO-ED2 period. The cost per annum is not in the RIIO-ED2 business plan and relates to costs that will be incurred after 1 April 2023 only.
- We continue to utilise these units in storm events.

Benefits

- Increased ability to quickly provide temporary restoration for customers during major events and business-as-usual.
- Simplification of connection of generators frees up technical resource to concentrate on network repairs.
- Size and type of generator allows for targeted and specific deployment that caters to customer needs.
- More sustainable options as we look to utilise increasingly less-carbon intensive sources in our operations.
- Less noise disruption for customers as we utilise silent generation.
- Through generation at HV we have the ability to temporarily restore large numbers of customers at once.
- Also, in response to Storm Arwen we leased 100 new 'wheelbarrow' style generators. This lease will continue to incur costs into the next period, the costs of which are included in this initiative.

Considerations

- There is a logistical programme required to support generator deployment. This includes tracking volumes of available generators, deployment, refuelling programmes, safe connection and removal, and security of the units from theft and vandalism.
  - A key factor in our decision to make greater use of small-scale in-home generators.
- Volume of generators to procure. There is a tipping point at which it is more sensible to focus on a permanent repair than deploying generation. There is also the storage and maintenance overhead associated with each unit as they need to be ready-to-use all year round.
- Our proposals are targeted in order to balance the benefits of greater utilisation and diversity of generators against the associated upkeep and deployment costs.

Deliverability

- We have sought to ensure that our proposals balance a conservative approach with making a meaningful contribution to improving our ability to support customers during a major incident.
- By proposing initiatives that progressively enhance our generator provision we are able to ensure that the proposals are deliverable in the short-term while being scalable in the next period if proven successful.

3. ENHANCING CUSTOMER CARE | £1.31m

Summary

This initiative includes four proposals that focus on improving the welfare provision we offer during an event and the compensation processes afterwards.

The compensation process associated with Storm Arwen was on a scale previously unseen in the industry, as such it exposed areas for improvement. We invested in improvements to our systems and processes while we have further planned works to complete the process enhancements.

Furthermore, Ofgem amended Regulation 19 of the Guaranteed Standards to Performance Regulations, with effect from 1 September 2023, to now allow payments to be made by 'bank transfer', which requires IT systems investment. These investments will make the process faster and easier for our customers.

The second proposal focusses on food provision for customers suffering power cuts during a major event. We have put in place agreements with food vendors to attend major event epicentres and provide warm food. The proposal is to fund the ongoing provision of that service.

The third proposal is to further invest in upgrading the welfare packs in support of Local Resilience Forums warm hub provision and vulnerable customers. Working with customers we have identified improvements to their design and contents.

Need for investment

- During Storm Arwen it became clear that better arrangements were required around compensating customers and welfare provision. The Storm Arwen Recommendations reinforced the intent. In response, we put in place a new compensation process and the food provision retainer. These were not in place at the time we submitted our RIIO-ED2 business plan.
- The investments we are seeking to make in our winter warmer packs are the result of Ofgem and DESNZ recommendations to explore best practice welfare provision and improve the support we offer.
- We invested significant funds in establishing and refining the compensation processes. This application relates only the costs of these changes that will be incurred after 1 April 2023.

Storm Arwen Recommendations

- **WF1:** DNOs, in consultation with resilience partners, to develop principles-based industry guidance on best practice in the provision of welfare support.
- **WF2:** DNOs to work with Local Resilience partners to agree clear roles and responsibilities during severe weather events, and incorporate them into DNOs' Emergency Plans.
- **WF3:** Where DNOs are providing discretionary support (e.g., accommodation, hot meals), DNOs should make clear to customers what support is available and how they can access it. DNOs should provide assurance this process is in place in their winter preparedness reporting to BEIS and Ofgem.
- **WF4:** DNOs to develop industry principles-based best practice, to guide how and when expense reimbursements are offered and made (especially when outages exceed 5 days), taking into consideration customers who cannot afford to pay for food and accommodation upfront.
- **CP1:** DNOs to develop more robust payment mechanisms capable of delivering payments at scale, and to continue their development of systems to support customer accounts. ENA to consider how data-led approach using smart meter data could improve the accuracy of compensation payments.

- **CP2:** DNOs to adopt lessons learned from 2021/2022 storms in their compensation payment processes, including a review and an update to the process of obtaining customer data. DNOs should also explore the options for customers to automatically receive direct compensation.
- **CP3:** ENA to lead on developing more publicity for compensation entitlement in the event of a power cut; to form part of winter preparedness.
- **O18:** DNOs to develop more robust mechanisms to enable the delivery of compensation payments at scale.

Optioneering

- For compensation process development, we considered insourcing all of the development work. However, while we have colleagues who would likely be able to build a process that works, it would mean taking them out of their normal job and asking them to carry out an activity that sits outside their specialism. This would likely result in a subpar process with reduced benefits for our customers.
- Similarly, we considered outsourcing all of development work through existing arrangements with our existing IT infrastructure support providers in order to develop the necessary tools.
- However, outsourcing the work would be more expensive and would mean that those developing the solution lacked experience and expertise of internal processes and customer outcomes.
- The optimum solution is a collaborative approach utilising the expertise of both parties.
- With regard to food provision, we already have our Customer Service Vans that provide a basic level of welfare provision. We considered whether we could expand the provisions each van carries so that it is able to serve more people.
- However, this service is limited on space and the type of service it can provide. It is not a catering service, and as such it cannot provide a substantial meal service.
- Similarly, we have worked with individual vendors on an adhoc basis when we were able to make arrangements. However, local businesses are unable to relocate as per the need identified and working with individual vendors requires a significant overhead to make the necessary arrangements.
- We also utilise online food delivery services, we considered whether increasing the utilisation of that would help. However, it is expensive and would not be able to scale as required.
- Instead, we sought out the National Caters Association and established the provision that is now in place that has little overhead, numerous vendors that can provide substantial meals and can scale to suit. We will continue to utilise this arrangement, reviewing the provision and alternative options when it is time for renewal.

Proposed Option

3.a. Improving the speed of compensation

- IT system development for more robust mechanisms to enable the delivery of compensation payments at scale.
- Efficiently processing customer compensation and reimbursement claims:
  - We have invested in improvements to our CRM system, which we use to process compensation payments as well as handling customer expenses reimbursement.
  - The improvements allow us to more easily process customer compensation claims and make faster payments.
  - The improvements include:
    - Upgraded customer-facing webforms for improved data collection and validation for issuing payments.

- Development of a series a compensation-specific workflows to manage the range of customer scenarios (e.g. payment only, dispute, new claim) and provide simpler task management and progress visibility for faster processing and customer updates.

3.b. Establishing a new electronic payments mechanism

- Ofgem amended Regulation 19 of the Guaranteed Standards to Performance Regulations, with effect from 1 September 2023, which allows for compensation payments to be made via electronic payment.
- We have explored options with two possible providers but neither provider offers an immediately viable solution:
  - *[Provider 1]:* This new product is not yet widely in use and main inhibitor is that there is no functionality to amend/cancel payments once instigated (e.g. in the case of a customer dispute).
  - *[Provider 2]:* Customer journey is not user-friendly, involving creation of user accounts to claim monies, which may deter customers from claiming their compensation.
- We will establish a project to explore options and trial an electronic payment solution with customers by March 2025.
- Implementation would require internal system development to integrate electronic payments into our processes, as well as setup and development costs with the third-party payment provider.

3.c. Food provision retainer and call out agreement

- We have put in place agreements with food vendors through the National Caterers Association, which provides access to a network of suppliers across our region, to attend major event epicentres and provide warm food.
- The current arrangement includes the retainer and a call out fee and additional costs per food and drink items.
- We utilised this arrangement during the events in Stannington (December 2022), supporting 12,400 customers.
- We also drew on this provision during Storm Pia (December 2023) and most recently Storm Jocelyn (January 2024).
- Using the past 12 months as a basis and extrapolating the costs for the five-year period we have based our application on serving 14,000 customers per annum for a total of just over £0.67m during the RIIO-ED2 period.

3.d. Improved Welfare Packs

- We provide winter warmer packs to our most vulnerable customers that include various provisions to assist during a power cut.
- Having reviewed the contents of the pack and engaged with customers, we are proposing to invest in more packs improving their design and expanding the provisions to include:
  - Thermometers, reusable hand warmers, battery powered glove-in-the-dark lights, portable power banks, glow-in-the-dark torches.
- We have based our request on issuing 5,000 per annum .

Benefits

- Faster compensation and reimbursement payments to customers.
- A simpler compensation and reimbursement application process.
- Quicker payments through bank transfer and no cheque process costs.
- Ensuring customers are able to access warm meals during major events.
- The ability to support wider resilience efforts – e.g. Stannington.
- Improved customer welfare and comfort.

Deliverability

- The majority of this initiative relating to compensation and food provision is already delivered in RIIO-ED2.
- We will establish a project to explore options for the electronic payment system in response to Ofgem's rule change regarding payment options. The options we have reviewed to date do not offer an immediately viable solution.

4. INCREASING OVERHEAD LINE RESILIENCE ON HIGHEST RISK CUSTOMER CIRCUITS | £30.05m

Summary

The majority of the damage from Storm Arwen was associated with the failure of legacy specification overhead lines impacted by high wind speeds during the event.

This initiative focuses on a programme of interventions to storm harden these highest risk sections of LV and HV overhead line.

To ensure proportionality of approach we've developed a resilience model which provides a measure of resilience for each feeder section which has been developed in line with new draft ENA EREC G132 standard. This model and supporting EJP provides a well justified rationale for the scale of intervention proposed to deliver the best value for our customers.

The E3C report highlights that any resilience enhancing initiatives on the network need to consider the impacts of outages on other essential services that are dependent on power such as the telecommunications and water sectors whilst prioritising 'High Risk Communities'. For all our highest risk HV overhead line feeder section locations we have engaged with these stakeholders and fed this data into our resilience model.

Our proposed option is to target the most at risk HV feeders. This option enhances resilience for 61,883 customers including 22,650 vulnerable customers whilst providing the highest cost benefit of all the options considered.

This initiative deploys a range of measures on the at risk HV feeders that reduce the likelihood of a fault occurring and improve our ability to restore supplies once a fault does occur. We have also assessed where it is opportune to provide interconnection with other network operators at the edge of our network to mutually support our communities.

At LV we are targeting all legacy specification bare conductor feeders at high altitude or close to the coast. These are historically impacted by the most extreme weather conditions.

Given the level of investment proposed here an Engineering Justification Paper (EJP) has been created "Storm Arwen Reopener – Enhancing overhead line resilience on highest risk customer circuits". This provides the detailed analysis and justification for this initiative.

This investment is incremental to our RIIO-ED2 business plan submission as the needs case for the additional work was identified as a result of the Storm Arwen report recommendations on the need to improve resilience.

Need for investment

- The evidence from the impact of Storm Arwen on the NPg network and the asset specific risks show that the HV overhead line asset base should be prioritised (over LV and EHV) for enhanced resilience and restoration. Incidents on the HV overhead line network were responsible for almost 90% of the total customers off supply during Storm Arwen.
- Although much of the damage from Storm Arwen was associated with the failure of HV overhead lines, 5% of faults were due to debris and falling trees on LV overhead lines. A key challenge on LV overhead lines in storm conditions is that faults can be hidden by faults higher up the network on HV overhead lines, which compounds interruptions seen by our customers.
- LV feeders in coastal areas have also been shown to be affected by stronger and more continuous wind exposure. These conditions have been shown to become more likely due to climate change. For these reasons we are also targeting the highest risk LV overhead line sections.

- The basis of our RIIO-ED2 submission for HV overhead line rebuild and refurbishments was developed predominately from pole health data with minimal consideration of the design specification or environment the poles are situated in.
- Modern overhead line design specifications, such as ENA TS 43-40, consider more robust construction at higher altitudes taking into consideration weather conditions. This consideration was driven by learning from previous storm activity. Overhead lines built at high altitudes to legacy specifications are at most risk of damage under storm conditions. This combination presents the highest risk lines (least resilience) in the context of storm conditions.
- The analysis for this investment has considered the design specification and restoration capability of overhead lines to provide an assessment of resilience to storm conditions. This is in line with new draft ENA EREC G132 standard.
- The output from our stakeholder engagement has been incorporated into the assessment methodology as well as consideration of existing vulnerable customers.
- We have been proactive in exploring opportunities for cross-DNO collaboration to improve resilience on the fringes of our network. We have engaged with two other DNOs, ENWL and SPEN. These DNOs share borders with our region along the Pennines and Scottish Borders and were significantly impacted by Storm Arwen. These communities may benefit from using interconnection with other network operators during fault conditions, and vice versa.

Storm Arwen Recommendations

- **E2:** Review and update as required the current distribution and transmission network infrastructure and standards (including ETR132, OHL designs and vegetation management) to ensure they are fit for purpose, especially for spur lines in rural areas.
- **R1:** E3C to review and update industry best practice to ensure DNOs can quickly identify faults and safely assess the extent of network damage earlier in a severe weather event. This review should include the role of smart meter data and technology for this task.
- **R5:** E3C to identify other appropriate areas where mutual aid could be appropriately and effectively deployed, specifically considering the areas of welfare, customer communications and resourcing support, and whether mutual aid agreements could be expanded to include, for example, gas distribution operators.
- **O1:** E3C should review current network infrastructure standards and guidance, including those for vegetation management and overhead line designs, to identify economic and efficient improvements that could increase network resilience to severe weather events.
  O6: E3C should review and update industry best practice for identifying faults and assessing the extent of network damage, to reduce customer restoration times.

Optioneering

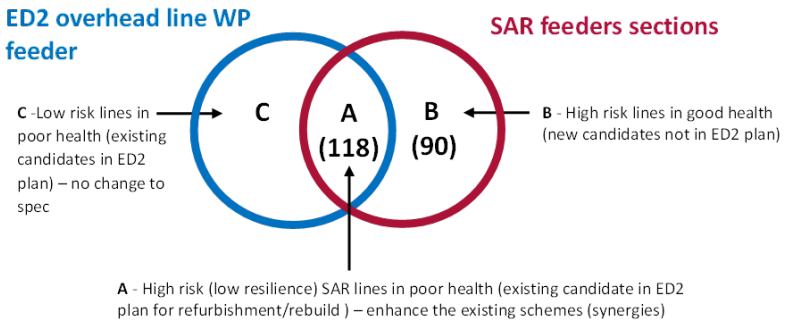
- Extensive optioneering has taken place in the development of this proposal and is set out in detail in the accompanying EJP.
- Through analysis of our overhead line data, we have identified 208 HV feeder sections that are the least resilient. Then, to carry out optioneering for the proposed interventions on those 208 HV feeders, we developed a resilience model which considered both the construction and the capability to restore of the overhead line including customer impact.
- Using the model five different intervention options were evaluated with the least cost option being selected based on its superior cost benefit ratio and ability to be delivered in RIIO-ED2.
- On the interconnection proposal, there were 25 potential HV interconnectors between the DNOs with the amount of customer benefit, cost of solution and deliverability risk varying across

them all. Joint DNO analysis identified eight viable and beneficial interconnectors to link fringe networks together and provide mutual support between DNOs.

- With regard to LV resilience, through analysis of the LV overhead line data, 76 LV feeder candidates at high altitude and 69 LV feeders in close proximity to the coast were identified from the total population.
- The range of interventions is more limited at LV and considered the two feasible options of using ariel bundled conductor (ABC) or undergrounding. Although undergrounding provides the most benefit in terms of storm resilience it does come at a cost of more than four times than the alternative of using ABC and so it was not selected.

Proposed option

- In applying our assessment methodology to the entire HV overhead line population, 208 of 24,546 feeder sections are deemed as being at highest risk.
- This investment for enhanced resilience is incremental to our ED2 plan for condition-based replacement ("C category"). There is some overlap with our ED2 planned interventions ("A category" poor health, legacy design specification and high altitude) and some high-risk areas not previously identified ("B category" good health but legacy design specification and high altitude). This overlap is shown in the Venn diagram below:



- For feeder sections that are in our RIIO-ED2 plan and we have identified only the incremental costs to provide enhanced resilience on these feeders.
- For feeder sections that are not in our RIIO-ED2 plan we have included all the cost of the required interventions for enhanced resilience on these feeders.
- We are proposing to intervene on 168 of the 208 high risk HV feeders.
- The geographic spread of these interventions cover the network areas impacted by Storm Arwen and other areas assessed to be at risk. Our supporting EJP demonstrates this in more detail.
- We have proposed a similar strategy for LV OHLs but given that LV feeders are inherently shorter and do not have the same asset specific risks as HV OHLs the candidate selection is different. For LV feeders the approach is to identify the least resilient candidates at feeder level, targeting high altitude or coastal lines which are bare conductor.
- We are proposing to intervene on 76 LV feeders at high altitude and 69 LV feeders in close proximity to the coast.

Interconnection with ENWL and SPEN

- We are proposing new HV interconnectors with other DNOs. These were developed based on desktop studies. Post submission, proposed candidates will be subject to site surveys to finalise the design and work with local landowners. Through coordination with the other DNOs we have

discussed the solutions to a sufficient level to facilitate costing, and have agreed that each DNO will be liable for 50% of the cost of an interconnector. The only exception is where the benefit is High-Low, the DNO with the High benefit will fully fund the interconnector. Each DNO will fully fund any upstream reinforcement required on their network to provide the required capacity.

- The justification for implementing these interconnectors is underpinned by the fact that we are taking a 'whole system planning' approach; this has inherent efficiencies through apportioning costs and delivery resource across multiple DNOs to enhance resilience. There is a twofold advantage for each DNO; the first is the provision of an alternative supply at a substantially lower cost for each DNO relative to an intra-DNO interconnector. The second is the higher level of security and diversity, relative to an intra-DNO interconnector, which is realised by virtue of supply being from separate DNO networks. As power dependency increases with increased future electrification in these isolated, fringe areas of our network, the enhanced resilience will become increasingly vital.
- There are 4 proposed HV interconnectors with SPEN in the Scottish border region.
- There are 4 proposed HV interconnectors ENW in the Pennines region.

Engineering solutions

- The solutions considered in this initiative are drawn from those highlighted in ENA EREC G132 for improving resilience, international best practice and collaborative solutions with our neighbouring DNOs. These solutions are shown below and are split into three categories: enhancing design specification, enhancing restoration capability and risk removal.
- Enhancing design specification
  - Install larger crossarm (HV)
  - Install additional pole on existing line (HV)
  - Upgrade pole (HV)
  - Upsize conductor (HV)
  - Convert open conductor to Aerial Bundled Conductor (LV only)
- Enhancing restoration capability
  - Install Remotely Indicating Fault Flow Indicator (HV)
  - Install pole mounted remote control (RC)/automation point (HV)
  - Install step-up generator platform (HV)
  - Transformer rationalisation (LV & HV)
  - Install interconnection (HV)
- Risk removal
  - Undergrounding (LV & HV)

Benefits

- Improved resilience for 61,833 customers served by high-altitude legacy design specification HV overhead lines.
- Whilst the interventions we have proposed are for enhancing resilience, some of them such as conductor upsizing have inherent secondary benefits of reinforcement which future proofs parts of our network to help deliver net zero.

Deliverability
• We have considered the magnitude of our existing overhead line renewal programme in our RIIO-ED2 plan and identified resilience improvements that can be made incrementally to that activity. Where interventions are required on overhead line feeders that are not in our RIIO-ED2 plans we have considered the ability of our contractors to deliver this additional activity and we have scaled our ambitions accordingly. • Making fundamental changes to the resilience of our highest risk overhead lines cannot be done in a single price control period. • Securing approvals from landowners is a risk and we have tried to identify solutions that minimise that impact. Our interconnection proposals with other DNOs which involve new circuits represent the biggest delivery risk for us.

6. Costs in Detail

48. In this section we set out the costs for each initiative, their impact on our RIIO-ED2 allowances or and activities, a statement on the efficiency of the costs and the cost allocation between Northeast and Yorkshire.

49. For the increasing overhead line resilience initiative, we only briefly cover some of this information in this document as it is extensively set out in the accompanying engineering justification paper.

50. With regard to the regulatory treatment of the funding and delivery of this reopener, we propose that the funding should be delivered under an ex-ante use-it-or-lose-it (UILOI) allowance, supported by a reputational output reporting framework that ensures the DNOs are delivering benefits to their customers. The utilisation of reputational incentives for the activities included in this reopener application is consistent with the approach taken for monitoring delivery of similar activities in our RIIO-ED2 Business Plan.

51. The table below summarises the position for each initiative:

Table 3: Summary of NPg Storm Arwen Initiatives

Regulatory treatment	Northern Powergrid initiatives	Proposed Target date
ODI-F	Not suitable	-
ODI-R	– Improving intelligence and response coordination	31 March 2026
	– Making greater use of generation	31 March 2026
	– Enhancing customer care	31 March 2026
	– Increasing overhead line resilience	31 March 2028
Price Control Deliverable	Not applicable	-

52. Our assumption is that these arrangements would be agreed with Ofgem post this submission.

53. **Justification of costs in addition to ED2 ex ante allowances.** It was during Storm Arwen that the final RIIO-ED2 business plans were submitted. The business plans did not, therefore, include the actions and costs associated with improvements to storm response implemented during the 2021-22 winter storms period or the costs associated with proposed actions in response to the Storm Arwen Recommendations.

54. Correspondingly, Northern Powergrid's allowances for the RIIO-ED2 period (2023-28) do not account for the costs set out in this section.

55. **Cost efficiency assumptions.** Our RIIO-ED2 business plan included £378.4m of costs efficiencies, including (but not exclusively) unit cost and volume efficiency, improvements in network monitoring and targeting expenditure, benefits from customer flexibility and smart grid solutions. The costs in this reopener application are additional to the RIIO-ED2 Business Plan, building on these efficiency assumptions.

56. **Indirects Scalar.** The Increasing overhead line resilience on the highest risk circuits initiative includes a request for the indirect costs associated with delivering this capital investment, to cover costs such as design, project management and clerical support. We have aligned this request with the Indirects Scalar (Special Condition 3.12) and calculated the value as an increment of 10.8% of the capital investment requested.

57. **Infrastructure and Projects Authority Cost Estimating Guidance.** In keeping with the spirit of the Infrastructure and Projects Authority Cost Estimating Guidance we have adopted a proportionate approach to the production of cost estimates in this reopener application. The Engineering Justification Paper sets out the detail of the assessment carried out for the overhead line resilience initiative, which accounts for the majority of our application. The work carried out for the other smaller initiatives is contained within this document and is relative to the size of the funding requested.

58. **Cost uncertainty.** With regard to cost uncertainty, the cost of investing in the resilience of our network is not uncertain and the remainder of the initiatives will be executed through competitive tendering exercises, thereby mitigating the uncertainty of forecast cost levels.

Table 4: Northern Powergrid Cost Summary

Northern Powergrid initiatives (£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
1 Improving intelligence and response coordination	**0.00**	**0.00**	**0.67**	**0.03**	**0.03**	**0.73**
1a Major incident command vehicles						
1b UAVS						
2 Making greater use of generation	**0.16**	**0.16**	**1.81**	**0.28**	**0.28**	**2.69**
2a Portable battery packs						
2b Hybrid generators						
2c Silent power vehicles						
2d Overground cable event boxes						
2e Step up generators						
2f Generators for resilient hubs						
2g Trailers for wheelbarrow sets						
2h Wheelbarrow generator lease						
3 Enhancing customer care	**0.26**	**0.33**	**0.24**	**0.24**	**0.24**	**1.31**
3a Improving the speed of compensation						
3b Establishing a new electronic payment mechanism						
3c Food and provision retainer and call out agreement						
3d Improved welfare packs						
4 Increasing overhead line resilience	**0.00**	**0.11**	**1.31**	**14.31**	**14.31**	**30.05**
4a Convert open conductor to Aerial Bundled Conductor (ABC)						
4b Install Remotely Indicating Fault Flow Indicator (RIFFI)						
4c Install pole mounted remote control (RC)/automation point						
4d Install step-up generator platform						
4e Transformer rationalisation – replace several PM transformers with a GM substation						
4f Install interconnector at 8 locations						
4g Replace cross arm						
4h Install additional poles on existing line						
4i Upgrade pole size						
4j Upsize conductor						
4k Underground line						
4l Indirect Scalar						
Total	**0.42**	**0.60**	**4.03**	**14.87**	**14.87**	**34.79**
Ongoing Efficiencies (OE)	0.00	-0.01	-0.08	-0.44	-0.59	-1.11
Real Price Effects (RPE)	0.00	0.01	0.07	0.41	0.56	1.05
Total post OE and RPE	**0.42**	**0.60**	**4.03**	**14.84**	**14.84**	**34.72**

Table 5: Improving intelligence and response coordination costs in detail

	Northern Powergrid initiatives (£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
1. Improving intelligence and response coordination							
	1a. Major incident command vehicles						
	(£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
	1b. UAVS						
	•						

Efficiency

- The costs of this initiative are incremental to our RIIO-ED2 submission and do not remove or reduce any other costs.
- The expenditure proposed will utilise existing contractual arrangements that are the result of a competitive tendering exercise and are regularly reviewed.
- The mobile command vehicles will be purchased through the same vehicle leasing organisation who provide all our fleet vehicles, Vehicle Leasing Services.
- We do not expect that investment in the mobile command units will impact on other allowed expenditure.
- The UAVs will be purchased through regularly reviewed procurement process. Alongside that procurement process, we will also take into account cyber security and ensure that any vehicles purchased are done so in line with our IT security policy which protects against harmful devices from foreign actors.
- To that end we have sought to be targeted with the volumes that we propose to purchase, opting for a conservative approach that will still materially improve our reconnaissance across our organisation and increase our speed of response.
- With regard to training, one of the other overheads associated with this technology, we have in house UAV pilots who we will utilise to train new pilots.
- We will also continue to explore the utilisation of the UAVs for reconnaissance and overhead line inspection building any further efficiencies into our RIIO-ED3 plans.
- The production of these cost estimates has been carried out in accordance with the spirit of the Infrastructure and Projects Authority Cost Estimating Guidance regarding proportionate assessment in line with the level of cost being requested.

Cost allocation
• Costs will be split 50:50 between Northeast and Yorkshire

Table 6: Making greater use of generation costs in detail

Northern Powergrid initiatives (£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
2. Making greater use of generation						
2a. Portable battery packs						
–						
(£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
2b. Hybrid generators						
▪						
(£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
2c. Silent power vehicles						
–						
(£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
2d. Overground cable event boxes						
•						
(£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
2e. Step up generators						
•						
(£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
2f. generators for resilient hubs						

–

(£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
2g. Trailers for wheelbarrow sets						

•

(£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
2h. Wheelbarrow generator lease						

•

Efficiency

- The costs of this initiative are incremental to our RIIO-ED2 submission and do not remove or reduce any other costs.
- The expenditure proposed will utilise existing contractual arrangements that are the result of a competitive tendering exercise and are regularly reviewed.
- We have also sought to strike a balance between purchasing a volume of units that will make a meaningful improvement to our storm response while taking a conservative approach to costs.

- With regard to units such as the small-scale batteries, hybrid generators and step-up generators, we have clearly identified where they would significantly advance our response and the support we can offer our customers - whilst also being more sustainable that diesel powered options – but we are limiting the volumes we purchase to strike that efficient balance. It is our view that we should invest now to improve the service for our customers with a view to investing further in RIIO-ED3.
- Elsewhere, things like silent power and vehicles for transporting generators, we have proven the technology to be effective and more units available to us will make a positive difference. We have existing contracts in place that were the result of a competitively tendered process, we have reviewed alternative options as part of this exercise, and we continue to have confidence that these are the most effective units.
- We expect greater utilisation of some of the smaller, greener and simpler-to-connect generators will improve customer outcomes in business as usual and have a marginal impact on other allowed expenditure. As we have these units available to deploy for planned or unplanned power cuts, we may be able to reduce the number of diesel generators that we utilise during the same period, thereby saving some of the fuel costs and the resource costs associated with any specialist skills required to connect the generator.
- The production of these cost estimates has been carried out in accordance with the spirit of the Infrastructure and Projects Authority Cost Estimating Guidance regarding proportionate assessment in line with the level of cost being requested.

Cost allocation
• In almost all cases the costs will be split 50:50 between Northeast and Yorkshire. However, at this time we plan to put both mobile command units in the Northeast given the prevalence and impact of events in that region, and the greater number of isolated communities. The vans will be available for dispatch to Yorkshire, but they will be stationed with Northeast.

Table 7: Making greater use of generation costs in detail

	Northern Powergrid initiatives (£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
3. Enhancing customer care							
	3a. Improving the speed of compensation						
	▪						
	(£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
	3b. Establishing a new electronic payment mechanism						
	• [						
	(£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
	3c. Food and provision retainer and call out agreement						
	▪						
	(£m, 2020/21 prices)	23/24	24/25	25/26	26/27	27/28	ED2 total
	3d. Improved welfare packs						
	▪						
	Efficiency						

- The costs of this initiative are incremental to our RIIO-ED2 submission and do not remove or reduce any other costs.
- The majority of expenditure proposed will utilise existing contractual arrangements that are the result of a competitive tendering exercise and are regularly reviewed.
- During Storm Arwen and the storms that immediately followed, at pace we developed an expanded compensation process. We worked with our existing contractors, as per contractually agreed rates, in an agile manner to arrive at the most effective outcome.
- We have spent the time since the event to further develop the process, reviewing the processes introduced during the storms, and in light of the Storm Arwen Recommendations, and working with our contractors to improve the processes.
- For developments that we are able to carry out in-house, we are doing so by utilising Northern Powergrid employee resource alongside our existing contractors, at the negotiated rate for their support services across our business, as it is the most cost-effective approach.
- For electronic payment processes, we will need an external partner. At this time, we have reviewed [Provider 1] and [Provider 2] offerings but we are, as yet, dissatisfied with the service and the cost. We will run a process throughout the year to find the most cost-effective solution.
- With regard to the food provision retainer, we opted for a retainer and call out fee arrangement as it strikes the right balance of ensuring the service is available without paying more than is necessary in years where we don't have many storm events. Also, establishing the arrangement through the National Caterers Association means that we do not have a range of bespoke agreements in place with local providers, which would be harder to manage, more expensive and subject to greater risk of providers being unavailable when we need them.
- The volume of welfare packs identified is based upon a ratio of around 1:3 for vulnerable customers who will receive food provision (item 4c) which reflects the percentage of customers on our Priority Services Membership – around 25% of total customer base.
- We are able to use these welfare packs during BAU power outages to aid vulnerable customers impacted for a prolonged period.
- We expect the benefits of these processes to improve customer outputs but they will not lead to cost reductions against existing allowances.
- The production of these cost estimates has been carried out in accordance with the spirit of the Infrastructure and Projects Authority Cost Estimating Guidance regarding proportionate assessment in line with the level of cost being requested.

Cost allocation

- Costs will be split 50:50 between Northeast and Yorkshire

Table 8: Increasing overhead line resilience costs in detail

	Northern Powergrid initiatives *(£m, 2020/21 prices)*	23/24	24/25	25/26	26/27	27/28	ED2 total
4.	**Increasing overhead line resilience**	**0.00**	**0.11**	**1.31**	**14.31**	**14.31**	**30.05**

- We propose capital expenditure of £30.1m.
- The Increasing overhead line resilience on the highest risk circuits initiative includes a request for the indirect costs associated with delivering this capital investment, to cover costs such as design, project management and clerical support. We have aligned this request with the Indirects Scalar (Special Condition 3.12) and calculated the value as an increment of 10.8% of the capital investment requested.
- For detailed information regarding this initiative, please review the accompanying Engineering Justification Paper.

Northern Powergrid

Efficiency

- The costs of this initiative are incremental to our RIIO-ED2 submission and do not remove or reduce any other costs.
- For all of the interventions we have identified we will be using framework contracts which reflect market tested costs in order to deliver the best value for our customers.

- Where we have targeted feeder sections that were in our RIIO-ED2 submission we have accounted for the synergies by building in only the costs for incremental interventions proposed in this initiative whilst undertaking the original work identified and funded for in the RIIO2-ED2 settlement.
- More detail on the efficiency assumptions regarding this investment is provided in the supporting EJP.

Cost allocation

- The costs are split 87:13 between Northeast and Yorkshire. The tables below set this out for each line item.

Northeast

Voltage	Item *(£m, 2020/21 prices)*	23/24	24/25	25/26	26/27	27/28	ED2 total
	Total	**0.00**	**0.11**	**1.12**	**12.51**	**12.51**	**26.24**

Yorkshire

Voltage	Item *(£m, 2020/21 prices)*	23/24	24/25	25/26	26/27	27/28	ED2 total
	Total	**0.00**	**0.01**	**0.20**	**1.80**	**1.80**	**3.81**

Appendix A: Mapping of individual requirements to the submission

Special condition	Section of submission
SPC 3.2, Part J, para 3.2.70 An application under this Part must: a) relate to changes set out in paragraph 3.2.67 agreed on or after 1 December 2021. b) (b) be confined to costs incurred or expected to be incurred on or after 1 April 2023; and c) (c) take account of other allowed expenditure that could be avoided or reduced as a result of the circumstances set out in paragraph 3.2.67.	• Section 4: Optioneering • Section 5: Initiatives identified to deliver improvements • Section 6: Costs in detail
Re-opener Guidance and Application Requirement document	
Needs case and business strategy alignment	• Section 5: Initiatives identified to deliver improvements - Need for Investment section of each initiative table • Section 6: Costs in detail, efficiency sections of each initiative table
Mapping application to Storm Arwen Recommendations	• Section 5: Need for Investment section of each initiative table • Appendix B: Mapping Northern Powergrid Storm Arwen reopener initiatives to Storm Arwen Recommendations
Consideration of options	• Section 4: Optioneering • Section 5: Initiatives identified to delivery improvements – optioneering section of each initiative table
Identification of preferred option	• Section 5: Initiatives identified to delivery improvements – Proposed Option section of each initiative table
Stakeholder Engagement and Whole System opportunities	• Section 3: Stakeholder engagement

Special condition	Section of submission
Cost information (paragraphs 3.19-3.21)	• Section 2: Regulatory Requirements section • Section 4: Optioneering • Section 5: Initiatives identified to delivery improvements (throughout) • Section 6: Detailed Cost section (throughout) • EJP for Increasing Overhead Line Resilience on Highest Risk Customer Circuits and associated CBA – which contains a greater level of detail on costs and assumptions due to the greater level of expenditure associated with this initiative compared to the smaller initiatives.
Engineering Justification	• Section 5: Initiatives identified to deliver improvements – where relevant throughout each initiative • Accompanying EJP

Appendix B: Mapping Northern Powergrid Storm Arwen reopener initiatives to Storm Arwen Recommendations

Storm Arwen Recommendations		Northern Powergrid Initiatives			
Ref	**Action**	**Improving intelligence and response coordination**	**Making greater use of mobile generation**	**Enhancing customer care**	**Increasing overhead line resilience on highest risk circuits**
E2	Review and update as required the current distribution and transmission network infrastructure and standards (including ERT132, OHL designs and vegetation management) to ensure they are fit for purpose, especially for spur lines in rural areas.				●
R1	E3C to review and update industry best practice to ensure DNOs can quickly identify faults and safely assess the extent of network damage earlier in a severe weather event. This review should include the role of smart meter data and technology for this task	●			●
R2	E3C to identify options to enhance the use of mobile generators in reducing the length of power disruption, covering the population of mobile generators held by the DNOs and resourcing options to transport, install, refuel and remove.		●		
R3	Energy Network Operators should share best practices to ensure they each have a suite of resilient communications systems, considering developments in the telecommunications sector.	●			
R5	E3C to identify other appropriate areas where mutual aid could be appropriately and effectively deployed, specifically considering the areas of welfare, customer communications and resourcing support, and whether mutual aid agreements could be expanded to include, for example, gas distribution operators				●
R5a	NEWSAC membership to review and update and expand as required the list of specialist resources and equipment that could be called upon during an emergency response and put in place a process to keep the list updated		●		
WF1	DNOs, in consultation with resilience partners, to develop principles-based industry guidance on best practice in the provision of welfare support.			●	
WF2	DNOs to work with Local Resilience partners to agree clear roles and responsibilities during severe weather events, and incorporate them into DNOs' Emergency Plans.			●	

Storm Arwen Recommendations		Northern Powergrid Initiatives			
Ref	**Action**	**Improving intelligence and response coordination**	**Making greater use of mobile generation**	**Enhancing customer care**	**Increasing overhead line resilience on highest risk circuits**
WF3	Where DNOs are providing discretionary support (e.g., accommodation, hot meals), DNOs should make clear to customers what support is available and how they can access it. DNOs should provide assurance this process is in place in their winter preparedness reporting to BEIS and Ofgem.			●	
WF4	DNOs to develop industry principles-based best practice, to guide how and when expense reimbursements are offered and made (especially when outages exceed 5 days), taking into consideration customers who cannot afford to pay for food and accommodation upfront			●	
CP1	DNOs to develop more robust payment mechanisms capable of delivering payments at scale, and to continue their development of systems to support customer accounts. ENA to consider how data-led approach using smart meter data could improve the accuracy of compensation payments			●	
CP2	DNOs to adopt lessons learned from 2021/2022 storms in their compensation payment processes, including a review and an update to the process of obtaining customer data. DNOs should also explore the options for customers to automatically receive direct compensation			●	
CP3	ENA to lead on developing more publicity for compensation entitlement in the event of a power cut; to form part of winter preparedness			●	
O1	E3C should review current network infrastructure standards and guidance, including those for vegetation management and overhead line designs, to identify economic and efficient improvements that could increase network resilience to severe weather events.				●
O6	E3C should review and update industry best practice for identifying faults and assessing the extent of network damage, to reduce customer restoration times	●			●
O7	E3C should identify other appropriate areas where mutual aid could be appropriately and effectively deployed to reduce customer restoration times and enhance customer support during power outages.				●
O8	E3C should identify options to enhance the use of mobile generators in reducing the length of power disruptions.		●		
O18	DNOs to develop more robust mechanisms to enable the delivery of compensation payments at scale			●	