



Distribution Flexibility Services Procurement Statement

March 2021

1. INTRODUCTION

- 1.1. Northern Powergrid is responsible for the electricity network that powers everyday life for 8 million customers across 3.9 million homes and businesses in the North East, Yorkshire and northern Lincolnshire. Our team of around 2,700 colleagues operates 24 hours a day, 365 days a year to maintain a safe, reliable and efficient electricity supply. From pandemics to pouring rain, heat waves to hailstones, we work around the clock for our customers – no matter what the circumstances. We are responsible for circa 100,000 kilometres of overhead power lines and underground cables, spanning c. 25,000 square kilometres and more than 63,000 substations.
- 1.2. As we look to the future, it is clear that energy networks will have a central role to play in achieving decarbonisation and enabling customer deployment of new technologies is key to our decarbonisation strategy. In the next decade, electric vehicles, heat pumps and battery storage systems will increasingly become the norm in households and businesses. Our role as a Distribution Network Operator (DNO) is changing to reflect this shift. As we develop and mature, Distribution System Operation (DSO) functions will enable a more active role in managing our network in real-time to balance demand and supply locally. Our vision is to optimise the energy system including maximising its ability to absorb and utilise green kilowatt hours and ensure that customers can easily get the best value from their energy assets. In December 2019 we published our DSO v1.1 Development Plan¹ which sets out how we plan to create a customer-led system operator approach to managing future energy systems. In summer 2020 we published our emerging Thinking for ED2² that puts DSO in the context of our emerging plans for the next regulatory period.
- 1.3. In this statement we provide more detail on our plans for the coming 2021-2 regulatory year in one key area of our DSO Development Plan: DNO Contracted Flexibility. DNO Contracted Flexibility refers to a set of services whereby DNOs pay their customers to vary electricity use or production as an alternative to infrastructure solutions for network reinforcement. In this statement you will find:

¹ <https://www.northernpowergrid.com/asset/0/document/5139.pdf>

²https://engage.northernpowergrid.com/static/Emerging_Thinking_Overview-d90326b0030707edce1849c8f8515c74.pdf

- i. detail on our DNO Contracted Flexibility services needs for the coming regulatory year;
 - ii. more detail on our tendering process and pricing strategy for flexibility procurement;
 - iii. how we plan to engage with stakeholders to further develop markets and capability for DNO Contracted Flexibility services; and
 - iv. an explanation of the detailed quantitative assessments we have undertaken to evaluate our existing and forecast network loading and where necessary our flexibility requirements.
- 1.4. The scope of this paper excludes other aspects of customer flexibility such as Active Network Management (ANM) Flexible Connections (e.g. generation curtailment) or Price Driven Customer Flexibility (e.g. customer load shift in response to Time of Use Tariffs).
- 1.5. We are in the early stages of developing DNO contracted flexibility markets while the use of ANM is well developed. Through the provision of information in this statement, we are seeking to create opportunity for the growth in flexibility markets, offer our connections customers more choices, and build increased transparency and trust with our stakeholders that we are making the right investment decisions on behalf of our customers.**
- 1.6. We would value your views on the information we are releasing here. Please make contact in any way that suits, including through our flexibility mailbox – flexibility@northernpowergrid.com.

2. FLEXIBILITY SERVICE REQUIREMENTS

Our Flexibility Needs

- 2.1. Our assessment of future DNO Contracted Flexibility Service requirements is informed by our Distribution Future Energy Scenarios (DFES)³. DFES is published and updated annually and the scenarios within it model the range of potential and credible energy futures for our region. At the heart of the DFES process is a load forecasting model which maps projected energy loads on to our network. It's important to note that we are starting the 2020s against a backdrop of falling electricity demand in our region. Looking back over the ED1 price control period so far, we have seen a similar reduction in network wide utilisation to most DNOs, which has contributed to additional headroom for demand at higher voltages on our major substations. Peak demand has fallen 13% in our North East licence area and 9% in our Yorkshire licence area during the current ED1 period.⁴
- 2.2. Given this trend of reduced demand, capacity risk at our major substations is limited and our need for network reinforcement is currently relatively low for our major substations. We use load index (LI) utilisation bands to assess peak demand versus capacity at our major substations. Overall, the majority of our major substations (602) remain in the lowest risk bands (L1/L2) with none in L3 and only 3 in the highest risk L4/5 bands⁵. In addition, our licence requires us to comply with the P2/7 Planning Standard. Because of this low risk profile we only expect to seek providers for DNO Contracted Flexibility Services at two of our primary substations in the coming regulatory year (related to P2/7 compliance). At Normanby by Stow (Stow Primary substation) near Lincoln (postcode LN1 2AJ) and at Burton Pidsea (Burton Pidsea primary substation) near Hull (postcode HU12 9EY) we will be looking for flexible solutions for the purposes of reinforcement deferral. Further details of our requirements at these sites will be shared on the Flexible Power website when available.⁶

³ <https://www.northernpowergrid.com/asset/0/document/5836.pdf>

⁴ 2020/21 data not yet available

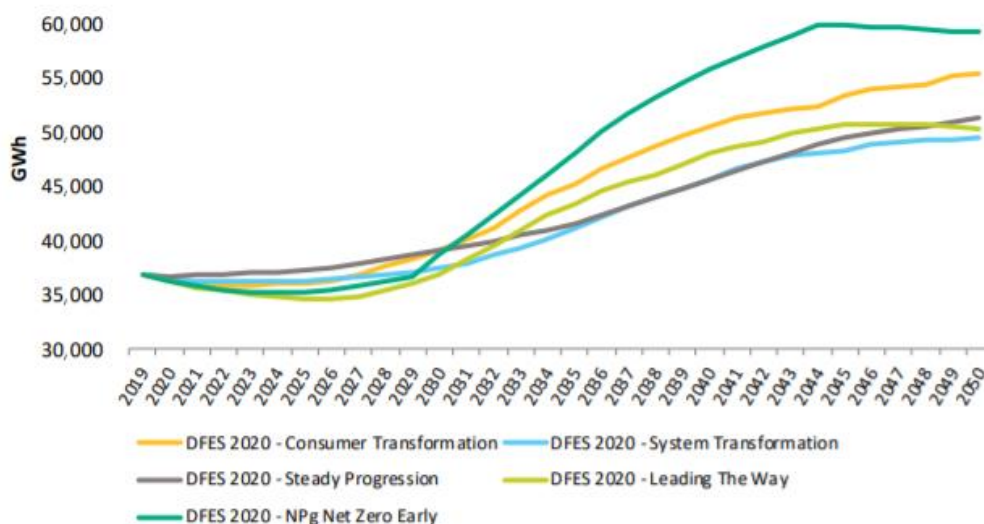
⁵ For a substation to be in band L4 or L5 peak demand must reach 99% of firm capacity at some point. Band L3 covers the range of 95-99% and L1 and L2 are 80% or below.

⁶ www.flexiblepower.co.uk

2.3. We remain committed to actively engaging with the market for Flexibility Services in our region and are continually analysing our network data to identify upcoming opportunities for flexibility procurement. In the coming regulatory year we expect to highlight, via the Flexible Power website, the locations on our major substation network where we are likely to need to tender for Flexibility Services in the upcoming ED2 period (2023-28). Via the ENA Open Networks project, we also continue to monitor and contribute to the development of the Common Evaluation Methodology (CEM) process, which is intended to provide transparency on how decisions are made by DNOs in choosing the optimal solution - between network reinforcement solutions and procuring flexibility services - to meet network needs. You can find more detailed information about the CEM and how we perform detailed quantitative assessment of our flexibility needs in section 5 of this report.

2.4. Our DFES analysis also looks further ahead to the upcoming ED2 Price Control period (2023-28) and beyond to 2050. All five DFES 2020 scenarios predict that total energy consumption in our region will remain relatively flat in the 2020s while starting to cause localised network constraints; however, we expect uptake of low carbon technologies to drive significant increases in total energy consumption through the 2030s. As such, the next five year period is an important time to build flexibility processes to manage the localised constraints as well as get ahead of the increasing need in future periods. Figure 1 below shows predicted annual electricity consumption scenarios as presented in our 2020 DFES:

Figure 1: DFES annual electricity consumption, NPg regions 2019 - 50



2.5. Increased uptake of low carbon technologies (LCT) drives increased electricity demand across all five scenarios through the 2030s. In addition to increasing overall network load, this adoption of

LCTs is likely to increase network load at low voltages in specific areas which will in turn require intervention either through flexibility services or reinforcement. Our flexibility market tests have already sought aggregated low voltage flexibility as a potential solution to provide customer benefit by offsetting the need for reinforcement on the 132kV and EHV system. We expect that development of LV (230/400V) flexibility to benefit the LV and HV (11-20kV) networks will continue to develop such that it becomes a key pillar in ensuring economic and efficient management of our network in the future. In the coming regulatory year and throughout the ED2 Price Control period we will actively look for opportunities to participate in and support innovation in the market for flexibility services at low voltages. You can read more about our stakeholder engagement plans in section 4 of this report.

- 2.6. Alongside this stakeholder engagement we continue to invest in ‘key enablers’ for decarbonisation. These are typically those actions which can allow us to implement low cost flexibility solutions for our customers, enhanced co-ordination for the operation of the distribution and transmission systems and provision of energy system data. Our objective is to maximise sustainability by making the most of our existing extensive asset base to enable customers to connect, at least cost, more generation and increase or change their pattern of energy use – in particular with electric vehicles and electrical heating. You can read more about our programme of key enablers in our DSO v1.1 Development Plan⁷.

Procuring Flexibility Services

- 2.7. We believe that a key part of building DSO functionality is the active participation in developing a market for flexibility, giving all our customers the opportunity to take an active part in the energy system by using their energy resources to support the network when we need it. We hope to future proof our network through the utilisation of both generation and demand flexibility to help balance the system. This includes both commercial and domestic users being able to shift the way they may have normally used energy in order to avoid more expensive solutions being deployed.
- 2.8. Ofgem Electricity Distribution Licence Condition 31E: *Procurement and use of distribution flexibility services* mandates us to procure Distribution Flexibility Services where it is economic and efficient to do so. In 2018, Northern Powergrid joined the Great Britain Distribution Network Operators (DNOs) in announcing a commitment to flexibility co-ordinated by the Energy

⁷ <https://www.northernpowergrid.com/asset/0/document/5139.pdf>

Networks Association (ENA). As part of this initiative we later committed to assessing flexibility service markets when reviewing requirements for building significant new electricity network infrastructure in Flexibility Commitment Market Principles.⁸

2.9. Our approach is to seek opportunities to deploy customer flexibility to maximise the operating efficiency of our network for three current key use cases. These are set out below in Figure 2:

Figure 2: DNO Contracted Flexibility Use Cases



Flexibility Services

2.10. Between DNOs and the Electricity System Operator (ESO) a coordinated approach is being developed with the Energy Networks Association (ENA) and the Open Networks project to enable a common approach for flexibility customers. As a result of this collaboration, four standard flexibility service definitions have been developed for use by DNOs, which we are now deploying:

1. Sustain

For the Sustain product, we would look to procure, ahead of time, a pre-agreed change in input or output over a defined time period to prevent a network going beyond its firm capacity.

2. Secure

We would procure, ahead of time, the ability to access a pre-agreed change in Service Provider input or output based on network conditions close to real-time.

3. Dynamic

We would procure, ahead of time, the ability of a Service Provider to deliver an agreed change in output following a network abnormality. In many cases this will coincide with long duration planned maintenance work.

⁸ ENA. Our six steps for delivering flexibility services. June 2019. Available at: <https://www.energynetworks.org/industry-hub/resource-library/open-networks-flexibility-commitment-2019.pdf>

4. Restore

Following a loss of supply, the Network Operator instructs a provider to either remain off supply, or to reconnect with lower demand, or to reconnect and supply generation to support increased and faster load restoration under depleted network conditions.

2.11. Figure 3 below shows how the standard flexibility services defined above relate to our three core uses cases for flexibility services.

Figure 3: mapping of DNO Contracted Flexibility Services to Standard Services

Use Cases		Services
Traditional reinforcement	To defer spending on traditional reinforcement.	Secure
		Sustain
Planned maintenance	To manage the risk of power cuts during long duration construction periods.	Dynamic
Emergency support	To provide emergency support during unplanned power cuts.	Restore

Flexible Power collaboration

2.12. In addition to Open Networks, we have joined with other UK DNOs to develop the Flexible Power toolkit, which incorporates a common market place, tendering, purchase and standards for flexibility services. This is now our standard route to engaging with the market and setting out our flexibility needs – for example we hosted an expression of interest process from November 2020 to January 2021 on our potential flexibility needs for the ED2 period. Detailed information about Flexible Power can be found at: <https://www.flexiblepower.co.uk/flexibility-services>

2.13. You can also read more about how we plan to set prices for and procure flexibility services in sections 3 and 4 of this report.

Dispatch Mechanism

2.14. The dispatch mechanism is being built as part of our Flexible Power toolkit. This replaces bespoke arrangements that have been put in place when DNO contracted flexibility has been trialled historically. Our deployment of Flexible Power to provide this capability is in development. It is envisaged that these systems will be installed and commissioned by the end of the 2021/22 regulatory year.

2.15. When they have been procured, dispatch of flexibility services will be managed by an Application Programming Interface (API) communicating between our Control Room and flexibility providers. This system capability includes a calendar for booking prearranged flexibility services, energy monitoring capability and a monthly billing system.

2.16. When a flexibility contract is in place the dispatch mechanism coordination between the Control Room and the customer has three key features:

1. Flexibility Start Switch On

The Flexible Power API gives contracted demand, generation or storage 15-minute notice indication for the customer and the Northern Powergrid Control Room to switch generation on or switch the load off. The Control Room engineer telephones the customer to confirm that agreed generation or load shedding will be available to switch on or off at the prearranged time. The customer switches the generation on or switches of the load at the agreed time.

2. Flexibility Stop Switch Off

The Flexible Power API gives 15-minute notice indication for the customer and the Northern Powergrid Control Room to switch generation on or switch the load off. The Control Room engineer telephones the customer to request to switch the generation off or that the load can be switched back on at the prearranged time. The customer switches the generation off or can switch the load back on.

3. Customer Emergency Stop

The emergency stop feature is when the customer needs to give notice of withdrawal of service in the event of a fault on the generation equipment or the inability to reduce load demand.

2.17. In cases where there is more than one flexibility provider available, the same dispatch principles and processes will be employed to dispatch the agreed flexibility by two or more flexibility providers. In the event of us needing to dispatch more than one flexibility provider in the same

constraint management zone and time window, we would stagger the start and stop times for flexibility provision in, typically, 15 minute intervals.

3. TENDERING PROCESS

Transparency and Fairness

- 3.1. As we transition to becoming a DSO, we retain responsibility for the integrity of the regional electricity system, operate DNO contracted flexibility and support the provision of flexibility from our customers to other system actors (e.g. energy suppliers, ESO, third party commercial aggregators). This entails us being a trusted and neutral platform able to support optimisation of the whole energy system and underpin the rapid transition to carbon-free electricity, transport and heat; a system with the customer at its heart. We recognise the centrality of openness and transparency in our decision making about flexibility procurement in building our position as a trusted, neutral operator.
- 3.2. As a regulated business, Northern Powergrid is bound by the Utilities Contract Regulations (2016)⁹ and the fundamental principles of transparency, proportionality, non-discrimination, fair and equal treatment to all, and mutual recognition to all regardless of value. To meet our obligations we have strict Procurement Policies, processes and procedures in place which must be followed.
- 3.3. With regards to DNO Contracted Flexibility Services, we are replacing the Dynamic Purchasing System (DPS) we used in 2020 for a previous market tender exercise. To achieve this a Periodic Indicative Notice, as a call for competition, will be issued to the Find a Tender Service to advertise our intention to any potential providers who wish to provide an offer to us. As noted previously in this report, Northern Powergrid will also publicly advertise all sites where flexibility services may be required using the Flexible Power website. This will guide potential providers with concise and transparent information with regards to what is required and the reasons why.
- 3.4. A pre-qualification questionnaire has been developed which will be published on our Electronic E-Tendering Portal for interested providers to complete. The opportunity will be available on a continuous basis and responses will be assessed periodically for inclusion on any subsequent tender list as and when services are let under the DPS. All procurement related documents with regards to future procurements will be published along with the Pre-Qualification Questionnaire as required by the Utility Contract Regulations.

⁹ https://www.legislation.gov.uk/uksi/2016/274/pdfs/ukxi_20160274_en.pdf

- 3.5. Northern Powergrid will follow our internal procurement policy for all mini competitions run with qualified service providers under the DPS. Standards for documents detailing all the contract award process and the evaluation criteria under which decisions will be made are detailed in these documents.
- 3.6. Northern Powergrid may conduct reverse Dutch e-Auctions to secure the most advantageous contract for specific sites. Any such auctions will be concluded in accordance with the regulatory framework detailed in the Utility Contract Regulations. All suppliers engaged in such auctions will received a notice at least two days prior to the auction with instructions of how to access and participate in the event.
- 3.7. Where an e-auction is not used, then a traditional request for quotation will be used and award shall be made in a waterfall manner from the most advantageous tender, down the rankings until all the required flexibility has been allocated to a provider or number of providers.

Pricing Strategy

- 3.8. Our pricing strategy seeks to balance the need to be as efficient as possible in our procurement with a recognition that, in the near future at least, flexibility markets in our region are likely to remain relatively illiquid.
- 3.9. Ideally, pricing for flexibility services would be set by a competitive process between the buyer of the flexibility service (Northern Powergrid) and providers. In most cases, we are likely to be the only potential buyer and our willingness-to-pay (WTP) for the flexibility service will be determined by the cost of the alternative actions (e.g. network reinforcement) available to us. Where applicable, any assessment of our WTP would need to take into consideration the option value associated with not making an irreversible network investment at a given point in time by procuring the flexibility service instead.
- 3.10. Looking at the results of our previous expressions of interest and tender for flexibility procurement and wider market intelligence, we observe evidence of limited participation in flexibility tenders held by DNOs to date, typically with one or two providers on average bidding in most locations. While participation in local flexibility tenders may improve in the future as these markets mature, it remains likely that in some locations there will continue to be a small number of flexibility providers available. This means that relying on competitive forces alone to reveal an optimal price may not be possible (at least initially). In these instances we will need to rely on alternative pricing approaches to ensure efficient procurement, such as a traditional request for quotation as referenced in the section above.

3.11. As set out in 'Tendering Process', our preferred approach for flexibility procurement is through a reverse Dutch auction. We would set a ceiling price for the auction reflective of our willingness-to-pay for the flexibility service. The costs of alternative options which determine our WTP will depend on the flexibility services being tendered for:

- **Sustain** would be procured months ahead of an expected constraint that would alternatively have been resolved by reinforcing the network. Our WTP would be determined by the cost of the reinforcement that would otherwise be required.
- **Secure and Dynamic** services are both closer to real-time services that we would procure ahead of time to deliver an agreed change in input/output based on network conditions. The alternatives determining our WTP in these instances would for Secure be similar to Sustain and for Dynamic would be either to contract with a back-up generator to turn-up closer to real-time or bear the costs of an outage (if it occurs).
- **Restore** services are post-fault. They can help reduce the period of time customers remain without power, and hence the costs associated with the power cut determine our WTP.

3.12. Whilst WTP can be used to set the overall ceiling price for an auction, contracts need to feature different pricing elements for effective procurement to take place. Particularly, WTP needs to be split to reflect:

- 1) an availability or arming fee (in terms of £ per MW of power) to ensure the providers are ready to provide the service when required; and
- 2) a utilisation fee, usually paid on a £ per MWh of energy when the service is dispatched.

3.13. Allocation between the availability and utilisation payments will need to take into account the risk allocation between the DNO and the flexibility provider. An optimal payment structure would need to balance the trade-off between the need for least cost procurement with our desire to work towards stimulating deep and liquid markets for flexibility services in our region. In the future we will continue to engage formally and informally with flexibility providers and other stakeholders to seek views and feedback about what optimal pricing structures could look like for DNO contracted flexibility products. We will also continue to closely monitor the results of other flexibility tenders run by DNOs with a view to using this market intelligence to evolve our own pricing strategy.

3.14. At least initially, we anticipate there may be situations where we tender for flexibility services but have few bidders interested in providing those services at our estimated ceiling price. If this happens, we will reach out to flexibility providers in the region to understand their willingness-

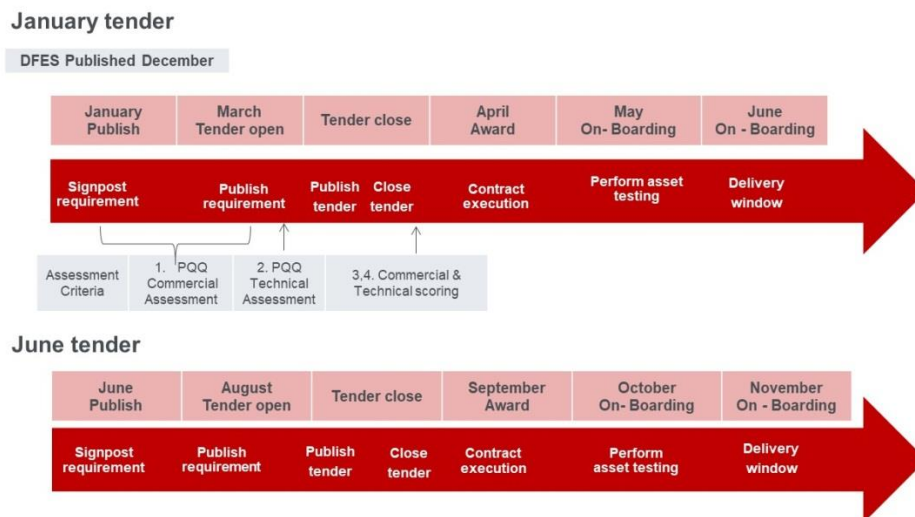
to-accept for the service and if there any other constraints that are preventing them from being able to provide us with flexibility services. Our intention is to use these learning opportunities to refine our pricing and procurement approaches with a view to securing more successful outcomes from future tenders.

4. STAKEHOLDER ENGAGEMENT

Procurement Timetable and Process

4.1. Future flexibility procurement will be biannual, with procurement windows beginning in January and June. We agreed this approach in collaboration with the ENA Open Networks project in response to market feedback which highlighted a desire from customers for a common approach to flexibility procurement across DNOs. Also, invitations to tender in January and June align well with existing electricity industry forecasting and reporting processes. Load Index Regulatory returns and Distribution Load Estimates are produced in Q3 and followed by DFES projections in December. A January invitation to the market for flexible solutions can then follow the publication of DFES in December. Figure 4 below sets out the biannual procurement timetable visually.

Figure 4: Biannual Flexibility Services Procurement Timeline



4.2. Wherever possible we will align our procurement activity to these biannual windows but if an urgent and unforeseen flexibility need should arise outside of the biannual procurement windows, we may still go to the market and publish a one-off invitation to tender.

4.3. As indicated earlier in this paper, the Flexible Power website will be used to signpost the need for flexibility services. An Expression of Interest will also be published and will include: the primary substation name, location name, post codes of the geographical area, maximum MW requirement, hour time of day, days of the week and months of the year flexible solutions are sought.

4.4. Where there is no need identified for either of these biannual flexibility procurement windows then we will notify the market so that there is total transparency on our intentions.

Planned Stakeholder Engagement

4.5. We have already set out in previous sections how we plan to advertise our need for flexibility services to interested providers and our procurement process and timeline. Here we expand on our broader stakeholder engagement plans with regard to DNO Contracted Flexibility products.

4.6. We are committed to helping build a flexibility market that works for all users of the network, providing confidence to the market that every decision is made on the basis of sound judgement. In line with this commitment, we contributed to the formation of the Energy Networks Association's (ENA) 'Our six steps for delivering flexibility services'¹⁰:

1. Champion a level playing field
2. Ensure visibility and accessibility
3. Conduct procurement in an open and transparent manner
4. Provide clarity on the dispatch of services
5. Provide regular, consistent and transparent reporting
6. Work together towards whole energy system outcomes

4.7. These steps outline our drive for consistency across network businesses to build an efficient flexibility marketplace. We see continued, proactive stakeholder engagement as an essential requirement for successful delivery on these commitments.

4.8. Our future stakeholder engagement on the implementation and development of flexibility services will reflect six key themes, set out in Figure 5 below. Collectively these themes summarise our key learning objectives as we continue to work towards building a deep and liquid market for flexibility in our region.

¹⁰ <https://www.energynetworks.org/newsroom/simplicity-is-key-to-unlocking-the-power-of-flexibility-says-open-networks-project>

Figure 5: Themes for Flexibility Services Stakeholder Engagement

Build our capability	<ul style="list-style-type: none"> • Ensure we have the people, processes and technology to be a successful future operator of distribution network flexibility services
Understand the possibilities	<ul style="list-style-type: none"> • Build our understanding of current and future use cases for distribution network flexibility services
Shape our approach	<ul style="list-style-type: none"> • Develop effective policy which fulfils our regulatory commitments as a DSO and meets the needs of our customers and stakeholders
Deliver our commitments	<ul style="list-style-type: none"> • Be open, fair and transparent in our procurement and operation of flexibility services • Fulfil our legal reporting obligations for Flexibility services, as set out in Ofgem distribution licence condition 31E: <i>Procurement and use of distribution flexibility services</i>
Build trust and momentum	<ul style="list-style-type: none"> • Build connections and partnerships with flexibility providers and other critical actors in the UK energy market (e.g. ESO, Ofgem)
Learn from others	<ul style="list-style-type: none"> • Align procurement approach and processes with other DNOs operating in the UK to ensure standardisation and ease of market access for flexibility providers • Engage with cross industry programmes (e.g. ENA Open Networks) to share best practice and benchmark our progress in our development of distribution flexibility services and wider DSO capability build

4.9. Looking ahead to the coming regulatory year and further in to the ED2 price control period, we plan to conduct stakeholder engagement in the following customer segments:

1. Energy Suppliers;
2. Third Party Aggregators;
3. Current and potential future demand connected customers (both LV, HV and EHV, with LV via aggregators);
4. Current and potential future generation connected customers; and
5. Local Authorities and Community Energy schemes.

4.10. As well as one to one customer engagement, we will also continue to engage actively with the ENA Open Networks project. As part of this, we will continue to conduct collaborative stakeholder engagement with our peers via workstreams and associated products as well as supporting the Open Networks Advisory Group and the ENA’s work on principles for flexibility.

4.11 Energy efficiency is another important focus area for our engagement and there is clear overlap in this space with our activity to engage with vulnerable customers about energy efficiency. Our engagement on energy efficiency is well established; as far back as 2014 we commissioned a study to assess the potential efficacy of energy efficiency as an alternative to network solutions¹¹

¹¹ www.northernpowergrid.com/news/new-research-highlights-potential-for-energy-system-win-win-win

and our Activating Community Engagement (ACE) project¹² explored how gamification could be a route to activating customer demand-side response (DSR). We have also undertaken a fuel poverty campaign with a reach of over 250,000 views and we have partnered with Energy Saving Trust to develop an app helping customers make smart decisions around their energy use. Looking forwards we plan to use our existing engagement as a base for future learning as well as to seek views from stakeholders about how energy efficiency may be used as a source of customer flexibility. For example, we plan to continue our engagement with the Boston Spa Energy Efficiency Trial, which aims to trial voltage management on the local network as a method of minimising long-term energy demand as well as engaging with the relevant policy developments and research in this area, including exploration of any modal shifts in customer behaviour post-pandemic.

Planned Engagement to Establish Common Rules for the Procurement and Use of Flexibility Services

4.12. This paper has already described in previous sections our ongoing collaboration with industry (DNOs and ESO) through the ENA Open Networks project and the ongoing development of standardised evaluation methodologies, flexibility products and procurement arrangements. This comprehensive programme of work will continue to be our primary channel for engagement on common working rules and co-ordination. Stakeholder input is welcomed and encouraged on this project.

4.13. We are also mindful of our licence obligation to consider the impact of any possible flexibility procurement on the total energy system. Where flexible solutions are sought the appropriate network studies and impact assessments are under taken on the distribution system to ensure that customers and Independent Distribution Network Operators (IDNOs) are not impacted outside of statutory limits. As part of the network study, consideration is given to ESO upstream assets where there are system restrictions such as system capacity or fault load levels. National Grid Future Energy Scenarios (FES)¹³ and Distribution Future Energy Scenarios (DFES) are also factored into our network studies.

¹² <https://www.npg-ace.com/>

¹³ <https://www.nationalgrideso.com/future-energy/future-energy-scenarios>

5. DETAILED QUANTITATIVE ASSESSMENT

Common Evaluation Methodology

- 5.1. In 2018, Northern Powergrid joined the other DNOs in the flexibility commitment co-ordinated by the Energy Networks Association (ENA).
- 5.2. One outcome of this initiative is the Common Evaluation Methodology (CEM) process that is intended to provide transparency on how decisions are made by DNOs in choosing the optimal solution - between traditional network reinforcement and procuring flexibility services - to meet network needs. Through our ENA Open Networks collaboration we are presently looking into further development of the CEM and accompanying cost-benefit assessment tool to address feedback from stakeholders that it does not go far enough in the areas of carbon assessment, optionality valuation, or evaluating ANM solutions or energy efficiency as additional options available to DNOs. Northern Powergrid will contribute to these developments with a view to eventually incorporate the use of the CEM and tool within our Distribution Network Options analysis and facilitate deployment of alternative solutions (be it DNO contracted flexibility, flexible connections, or energy efficiency solutions) where these are assessed as being more economic and efficient than investing in network reinforcement.
- 5.3. Whilst we continue to engage with the development of the CEM we recognise that we need to work with stakeholders to understand how we may accurately assess energy efficiency measures as an alternative option to network reinforcement, ANM Flexible Connections or DNO Contracted Flexibility. Currently, data from network monitoring is more comprehensive on the EHV system enabling a more accurate view of energy efficiency at the major substation level. Further, it is likely to be much harder to efficiently assess both implementation cost and the likelihood of energy efficiency schemes reliably resulting in reduced consumption during the specific time windows when network load needs to be managed. At Northern Powergrid we remain committed to supporting the development of the CEM and also to exploring opportunities to better understand future trends for energy efficiency in our region (as discussed in the stakeholder engagement section of this statement above).

How We Determine Our Flexibility Needs

- 5.4. This section sets out how we have determined the flexibility requirements set out in section 2 of this report. It's important to note that the method described below relates primarily to our determination of flexibility needs for resolving network constraints at our major substation

groups. In section 2 we recognised that there are other use cases for flexibility (i.e. use cases for Dynamic and Restore services) and also that increasing adoption of low carbon technologies (LCTs) is likely to increase network load at low voltages in specific areas which will in turn require intervention either through flexibility services or network solutions. We recognise that the processes below will need to evolve in line with our internal capability and the development of flexibility markets in our region.

- 5.5. Presently, our assessment of our flexibility needs starts with detailed analysis of current and predicted future demand patterns. Annually, major substation historical half hour (HH) demand data is collected and normalised with consideration given for known new connections. For recent years we calculate load index and distribution load estimates, based on known new load connections and load growth. For future years, we will use this information as input to our DFES process to forecast load growth to then inform load indices and distribution load estimates.
- 5.6. The datasets this process creates can be used to calculate constraints on the network which then enable flexibility requirements to be forecast for: constraint peak demand, the number of constraint events that exceed the asset limits and when they occur (time of day hour, day of the week, weeks and months of the year). It is from these network studies and findings that flexibility requirements (i.e. location, volume and time windows) can be determined.
- 5.7. At present requirements for DNO-Contracted Flexibility services are determined on a scheme by scheme basis. When a substation group is identified as requiring intervention a detailed assessment of the existing site capability is undertaken in the form of a revised Firm Capacity assessment. The optioneering in this assessment considers a range of suitable solutions which will include traditional (asset based) solutions, smart (i.e. technological items, for example Real Time Thermal Rating) and DNO-contracted flexibility solutions. The options are not deployed in isolation and adopted solutions could consist of a combination of different approaches.
- 5.8. Projected HH demand growth above the Firm Capacity of a major substation can also be utilised to fix the volume of demand that needs to be secured by a flexibility service. Analysis of this HH demand growth projection demand data allows us to better understand peak requirement (MW), total energy requirement (MWh), time of day, time of week and monthly requirements.
- 5.9. When identified, these flexibility requirements form the basis for market engagement. In order to understand the volumes of DNO Contracted Flexibility which may be available at a specific network location we would undertake a formal expression of interest (Eoi). The Eoi provides the future flexibility requirements and then explores the market to better understand whether

potential flexibility service providers currently exist, or would be prepared to invest in a particular area in order to provide a service. Volumes of flexibility detailed in the EoI are typically set for a five year window; this is because a five year flexibility solution would defer investment from one regulatory period to the next. We have already set out our approach to market engagement and flexibility procurement in detail in sections 3 and 4 of this report.