

System Planning

Ensuring that we can power our future

Question and Answer session

Electricity Futures Conference, October 2025

Question	Answer
We are planning a workshop in the new year to focus on climate adaptation and resilience. Who is the key person to attend from the DSO?	Infrastructure resilience sits with our Distribution Network Operator (DNO) colleagues and they can be contacted through our website - https://customer.nationalgrid.co.uk/contact-us/contacting-national-grid-electricity-distribution/general-contact-enquiries You may also be interested in reading Ofgem's position on infrastructure resilience for our next regulatory period (2028-2033), which is currently out for consultation. There's a big section on resilience (section 6). You can read it through Ofgem's website - https://www.ofgem.gov.uk/sites/default/files/2025-10/ED3-sector-specific-methodology-consultation-core-document_clean.pdf
Doesn't CP30 require decarbonised net zero energy by 2030 not 2050?	CP2030 sets a low carbon ambition for electricity only. Government commitments on industry, transport, housing, etc. are all at various dates between 2035 and 2050. In the DFES we're looking at both demand and generation. Clean Power 2030 is focused on the supply side, but the 2050 target is for the entire economy. So for demand all the way up to 2050 we're forecasting significant growth (e.g. from the electrification of heat and transport).
Please can you supply a link to the local authority workbook?	You can find information about the local authority workbook on our website https://dso.nationalgrid.co.uk/planning-our-future-network/local-authority-information It can be downloaded directly from our Connected Data Portal - https://connecteddata.nationalgrid.co.uk/dataset/dfes

When you talk about 'domestic air conditioners', are you making assumptions just for cooling, or for heating well?

Most air conditioning units do both. Residential is likely to see growth in this with their ease of install compared to air to water systems in certain homes plus the added benefit of cooling

We are aware that some heat pumps have a cooling as well as a heating mode, but we don't currently model this. Therefore we only model for cooling.

How many substations do you have hourly or faster measurements for (approximately)?

There is a multipart answer to this question.

We have comprehensive monitoring in place for all of our bulk supply points and grid supply points. These are at half hourly measurement intervals or, in some cases, even more granular and give us good visibility of what's happening on the network at that level.

As we go down the voltage levels, that visibility decreases, reaching around 5% of our 190,000+ 11kV substations, most of which are mounted on poles and at the mercy of the weather. To date, the monitoring technology hasn't been robust enough to withstand the elements, which explains the low percentage.

As a DSO, our biggest opportunity is in connected smart meter data to give us visibility of network performance. We now have around 72% of low voltage connected customers on a monitored connection and are working to ensure that this level of data is incorporated into our systems so that we get the best possible view of what's happening across the network.

If we can see in the 2024 NDP that the recommendation is to do XX by 2028 (e.g. a new transformer or a new 132kV circuit), is there any way we can check whether NGED has progressed these options since then?

Our annually published Distribution Network Operations Assessment gives a headline view over our progress for reinforcement and engineering work across the network.

We also publish upcoming Major Network Changes as part of our Long Term Development Statement (LTDS). There is less certainty on reinforcement planned further into the future as we may not be as far along in the optioneering process.

One specific example is new 132kV circuits from Coventry to Pailton to resolve an overload identified by 2028.

In relation to the specific example, we know that there are a number of related constraints forecast on the Coventry 132 kV network (specifically the Hinckley/Pailton/Rugby/Daventry ring) and will pick this up separately.

When you discuss winter evening peak, are you considering "demand turn up" - so peak loading might be in the middle of a sunny day or windy afternoon? (and might be higher than historic behavioural demand as wholesale prices will be low?)

We gave the example of winter peak demand as that is what was traditionally the time of peak loading on our network. However, we're now seeing constraints more frequently at other times of the year.

In our NDP studies, we look at all four seasons for demand, across multiple times in the day, and also a "peak generation" in the summer. We have also launched some demand turn up flexibility services to help manage constraints such as these.

Where does energy efficiency feature in reducing demand and wasted energy?

Our regulator is increasing the focus on energy efficiency for our next regulatory period. There will be a focus on planning, coordinating and delivering energy efficiency interventions. Please see 4.121 in the consultation Ofgem is currently running: [ED3 Sector Specific Methodology Consultation](https://www.ofgem.gov.uk/consultation/sector-specific-methodology-consultation-electricity-distribution-price-control-ed3) - <https://www.ofgem.gov.uk/consultation/sector-specific-methodology-consultation-electricity-distribution-price-control-ed3>

Interested to hear that flex is only considered as an upgrade deferral. What's your thinking around why it shouldn't be treated as permanent?

The current main use case for flexibility services in the RIIO-ED2 price control period is in deferring conventional reinforcement. As load is forecast to continue to increase for the vast majority of the network, the amount of flexibility required to manage a given constraint increases every year. Eventually the volume of flexibility required is unable to be provided by the network, triggering network reinforcement. Thus flexibility has normally been utilised as a shorter-term solution.

Moving into the RIIO-ED3 price control period deferral is not expected to be the main use case for flexibility. Flexibility will be used for more operational purposes and to manage network risk before reinforcement is carried out.

Both in RIIO-ED2 and RIIO-ED3 we will identify any scenarios where flexibility can be utilised as a more long-term solution. This would likely be in an area where load is expected to be temporarily high, followed by a reduction (or a levelling off). In these instances, flexibility could be used for period without requiring continually increasing volumes to be procured from the market.

What profiles of availability do you assume from demand side or local generation/storage?

The load profiles we use when undertaking strategic analysis of our networks are available in our [Customer Behaviour Report](https://commercial.nationalgrid.co.uk/downloads-view-reciteme/686103) (<https://commercial.nationalgrid.co.uk/downloads-view-reciteme/686103>), which can be downloaded from our [Publications Library](https://dso.nationalgrid.co.uk/resource-centre/publications-library) (<https://dso.nationalgrid.co.uk/resource-centre/publications-library>)

It is also published through our [Connected Data Portal](https://connecteddata.nationalgrid.co.uk/) - <https://connecteddata.nationalgrid.co.uk/>

Flexibility as a temporary deferment tactic suggests that there will always be budget to solve constraints. Is the key issue here that this happens 'eventually'? What are the guarantees around that?

The main use case for flexibility in the RIIO-ED2 price control period is to defer conventional reinforcement. This is changing as we approach the RIIO-ED3 period, when flexibility will be used to manage network risk and to support the network operationally. Whether flexibility is available in an area or not, as load continues to grow most constraints will “eventually” trigger reinforcement. It’s correct that there is finite delivery resource and budget available to carry out reinforcement, particularly as load growth is forecast to accelerate as we transition to a Net Zero economy. Accurate forecasts allow us to prioritise reinforcement where it is needed the most, and flexibility is expected to be a useful tool in managing uncertainty in load growth.

We will always be able to resolve network constraints, the question is how we will prioritise where investment is targeted first given the scale of reinforcement required.

To summarise we have clear plans to resolve every forecast constraint (as set out in our Network Development Plan) and meet our customer’s needs, but we will need to be smarter about where/when we target different interventions to ensure this is done fast enough to not be a blocker to the Net Zero transition. We will continue to be transparent about how we make these decisions and prioritise reinforcement in our Distribution Network Options Assessment.

Do your demand forecasts incorporate the impact of cost? e.g. if electricity bills are forecast to go up, what impact does that have on the adoption of EVs/heat pumps etc. If not, what are they based on?

Our scenario framework is based around NESO’s Future Energy Scenarios framework, encompassing four pathways.

There are some assumptions around economics in the definition of those scenario pathways, but we do not model the impact of the distribution of system charges in our DFES.

Also what patterns of use do you assume for domestic EV charging, and do you do anything proactive to manage patterns of charging at the time when the user asks for the connection, or afterwards when subsequent users want to connect

Our [Customer Behaviour Report \(https://commercial.nationalgrid.co.uk/downloads-view-reciteme/686103\)](https://commercial.nationalgrid.co.uk/downloads-view-reciteme/686103) goes into detail on this, with a chapter dedicated to Electric Vehicles. It can be downloaded from our [Publications Library](https://dso.nationalgrid.co.uk/resource-centre/publications-library): <https://dso.nationalgrid.co.uk/resource-centre/publications-library>.

I've got a few questions about assumptions around heat pumps if we might be able to follow up separately?

We would be really happy to answer any questions that you have. Please contact us directly – nged.energyplanning@nationalgrid.co.uk

With the increase in electrification of heat are historic profiles still the right view of usage do you think?

We have bespoke profiles for each technology, and heat pump demand profiles are created from studies measuring heat pump demand rather than general historic profiles.

We create different profiles for different types of electric heating e.g. air source HP, ground source HP, resistive electric.

You can find more detail on the profiles in our [Customer Behaviour Report \(https://commercial.nationalgrid.co.uk/downloads-view-reciteme/686103\)](https://commercial.nationalgrid.co.uk/downloads-view-reciteme/686103), which can be downloaded from our [Publications Library](https://dso.nationalgrid.co.uk/resource-centre/publications-library) - <https://dso.nationalgrid.co.uk/resource-centre/publications-library>

In terms of flexibility - is there a level of power consumption to take part in the flexibility?

No, there is no lower level.

How do you evaluate constraints at the secondary substation LV level? Do they get modelled similar to BSPs? Is flexibility considered at that level?

We have built an automated process to assess constraints on distribution transformers and our LV and HV networks are analysed by our secondary system planning team.

Flexibility is incorporated into some of the load profiles that we use, in particular with electric vehicles and electric heating (economy 7) customers.

I would definitely like some more help on what's important to note on constraints etc as we review our Local Plan.

Our Strategic Engagement Officers are on hand to support these discussions – please contact them by email in the first instance: nged.energyplanning@nationalgrid.co.uk

We also have created a guide to help as councils create their Infrastructure delivery plans, please contact us for more information about this.

I would be interested to know if V2G EV charging is being modelled going towards 2050?

We model vehicle-to-home flexible profiles, but we do not currently model vehicle-to-grid for edge case analysis.

In a review of innovation projects, we have identified that we need additional information to accurately incorporate this into our DFES analysis.

A review of Electric Nation Powered Up21 was carried out for investigating the feasibility of incorporating the V2G behaviours into the analysis. This review found that due to the sensitivity of customers to pricing (which is supplier-led not as a result of a DNO flexibility contract) and the purpose of this modelling, additional understanding of customer behaviour is required to accurately incorporate V2G into the DFES analysis.

The proportion split between the unabated and flexed profile varies for each scenario. It is important to note that this is not representing DNO procured flexibility; we do not model procured flexibility (including V2G behaviour) at this stage of the DFES as it would potentially mask future constraints, and not flag the area for future procurement of flexibility.

As we progress to an electricity dependent economy have you considered:

1. fault tolerance with at least a second primary grid connection between places as we would have for comms and data?

2. under the new 2 degree forecast for 2050 with contingent storm severity implicit, what plans do you have to bury your cables instead of pylons?

We plan our networks according to a number of different standards and obligations, one of which is called Engineering Recommendation P2. This sets out the level of security of supply (or resilience) that we need to plan our network to for the purposes of supplying demand to customers.

The majority of our primary networks have two or more transformers and circuits as the level of demand dictates the resilience with which the network must be planned to. More information on this is outlined in the Engineering Recommendation and in NGED internal policies, which outlines what credible outages we plan for - <https://commercial.nationalgrid.co.uk/documents/tech-info>

When undertaking optioneering on specific solutions and network investment we appraise the options of using overhead lines or underground cables. The decision can be impacted by lots of factors, including:

- the upfront cost of the assets required,
- the ease of installation and obtaining consents,
- the typical fault rate (how often does the asset fail),
- the time to fix once faults occur,
- The ease of maintenance

Climate adaptation considerations are becoming more of a factor in these decisions, and Ofgem have indicated this in the Sector Specific Methodology Consultation

A more skilled workforce is needed - is NGED increasing support to train up the required skills to rapidly deliver decarbonisation to the energy system?

Collectively, across UK industry, we face a shortage of experienced people with the critical skills needed to deliver the new infrastructure required to meet the country's growth ambitions. For networks, this includes specific roles such as overhead lineworkers, substation fitters, and cable jointers. For industry more broadly, there is high demand for project management professionals, cyber professionals and offshore engineering specialists.

At National Grid, we have already made significant strides, working closely with our supply chain partners and wider business community, the education and skills sector, and trade unions, to start to build the workforce needed to deliver the largest overhaul of the grid in generations.

NGED is committed to bringing in entry level talent through our apprenticeship and graduate programmes to ensure a sustainable workforce for the future. Currently, we have over 400 apprentices and graduates on scheme and plan to recruit an additional 200 in 2025, reinforcing our investment in the next generation of talent and providing opportunities for career progression.

Through STEM outreach, education, and internships, we are shaping the future energy workforce. In the first year of ED2, we engaged over 94,000 children on the topic of electrical safety. In the last year, we have engaged an additional 85,000 children and young people. These efforts are supported by annual graduate and internship programmes across network planning, asset management, and digital innovation, alongside inclusive schemes like the Power Network Craft Assistant.

National Grid is recruiting over 2,300 graduates and apprentices across our UK business over the next five years and National Grid's investment is expected to support 55,000 more UK jobs by the end of the decade.

Information about our early careers opportunities is available here:
<https://jobs.nationalgrid.com/uk/early-careers>
