

SP Energy Networks Preparing For Net Zero Conference Whole Systems Approach

Thank you for joining - this session will start at 10:00.

Develop a network that is ready for Net Zero Be a trusted partner for customers, communities and stakeholders Ready our business for a digital and sustainable future

AGENDA – Whole Systems Approach



10:00 – Welcome, Housekeeping & Safety Contact

10:10 - Flexibility Services: Demand Shift Trial

10:30 - Innovation Project Update: APPEAL

11:00 – Energy Data Hub: Network Development Plan published

11:30 – Incentive for Connections Engagement: Actions Completed

11:45 – Questions

12:00 - Close

Develop a network that is ready for Net Zero Be a trusted partner for customers, communities and stakeholders Ready our business for a digital and sustainable future

Housekeeping



Thank you for taking the time to attend today.

- This session is being recorded.
 - please let Louise know if you are not comfortable with this and we will take your comments in the Chat section
- Please try and keep background noise to a minimum by using the mute button when you are not speaking.
- We are keen for this to be an interactive session as your feedback is important.
 - please raise your hand electronically or use the chat function if you would like to ask questions to the speakers

We value your opinions, and we are keen to generate an open session with opportunities to hear your feedback.

Safety/Environmental Contact







Guy Shapland, Flexibility Lead, NP&R DSO

Flexibility Services Demand Shift Trial

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Internal Use



Flexibility Services - Demand Shift

Introduction

What is the purpose and potential benefits of the trial?

Understanding and Lobbying

- Outcome of a small trial can be modelled and scaled to a number of future LCT scenarios
- Evidence to work with Ofgem and BEIS on the future of Demand Shift as a potential service

Immediate PR Opportunity

- Opportunity to present an industry 1st live trial
- Key message that this is about reducing customer bills
- Developing comms plan with SPEN and SP Group

Demonstration of Capability

- Significant volume of ED2 flexibility contracted with Octopus Energy
- Opportunity to prove or disprove their capability

Positioning against ESO

- By demonstrating our capability and coordination we can push against the ESO
- Alternative model would be direct contract with ESO who would not be thinking about D Network



Flexibility Services - Demand Shift

Commercials

Bilateral Agreement signed with Octopus Energy to provide Demand Shift Service in UK - DNO first

Contract

Contract: Bilateral agreement signed with Octopus Energy to cover the trial period

Location: Dumfries, Galloway & Ayrshire **Product:** Secure, pre fault scheduled service

Capacity: Up to 12MW

Service Window: 3 x weekday events between 19:30 to 21:30 & 3 x weekend events between 05:30 to 07:30

(total 12 hours)

Cost: £350/MWh maximum contract value £50,400

System

SPEN:

Flexible Power: Manual process will be used to the manage service. FP will not be used on this occasion **Network Checks:** Full analysis carried out to identify the number of customers taking part in the trial, each mapped against a Secondary and Primary substation to understand loading and impact of trial on each. **Octopus Energy:** Octopus to run campaign to recruit customers by offering an incentive. Customers will be notified to turn up demand via text and <u>email. Octopus will provide full report post utilisation event.</u>

Network Mitigation

Engagement with District, Control Room, Network Planning and Smart Metering teams and both District and Control Room informed day ahead of trial.

Level of disaggregation mitigates impact at a GSP and Primary level, review of HV and LV impact and condition of Cut-Outs carried out.

Further work to model Demand Shift service in Network Planning ENZ model

Flexibility Services – Initial Trial Results



3 events held to date spread across different days of the week, initial results show a positive 'Demand Turn Up' response on receipt of a close to real time signal

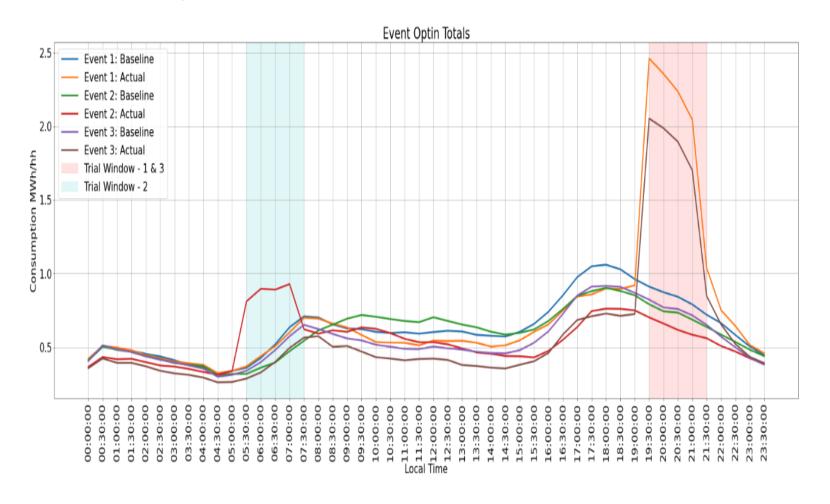
Events to date:

Thursday 17th March 19:30 – 21:30 Saturday 26th March 05:30 – 07:30 Tuesday 29th March 19:30 – 21:30

Date	Household s participate d	Total increase in consumption (MWh)	Average turn up per household (kW)	Households doubling consumption
Thusday 17 Mar	1505	6.03	2	1045
Saturday 26 Mar	1027	2.28	1.11	582
Tuesday 29 Mar	1323	5.03	1.90	891

Future dates:

Sunday 10th April 05:30 – 07:30 Wednesday 13th April 19:30 – 21:30 Saturday 23rd April 05:30 – 07:30



Octopus Demand Turn-up assessment



Used Engineering Net Zero model to assess network impact of Octopus demand turn-up trial

Octopus demand turn-up trial in Dumfries & Galloway / Ayrshire

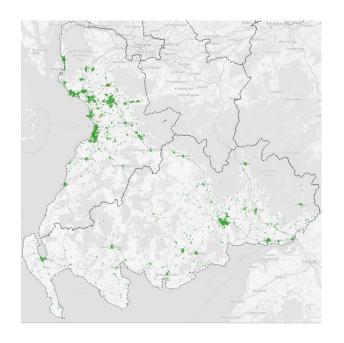
Measured Demand turn-up (MW)	10.6
Customers in trial	8,692
Affected HV/LV substations	2,011
Total customers supplied by those HV/LV	
substations	212,278
Affected primary substations	62



- Participating customer postcodes mapped to HV/LV substations
- Assumes worst case with 2022 demand (at time of peak demand)

Findings from ENZ modelling:

Scenario	HV/LV Sub (within cyclic)	HV/LV subs (above cyclic)	Primary subs ((above FC)	Customers (at risk)
10MW demand turn-up	0.2% (4)	-NIL-	-NIL-	-NIL-
20MW demand turn-up	0.4% (8)	0.1% (2)	1.6% (1)	9.7k
100MW demand turn-up	2.2% (44)	1.4% (28)	8.1% (5)	29k



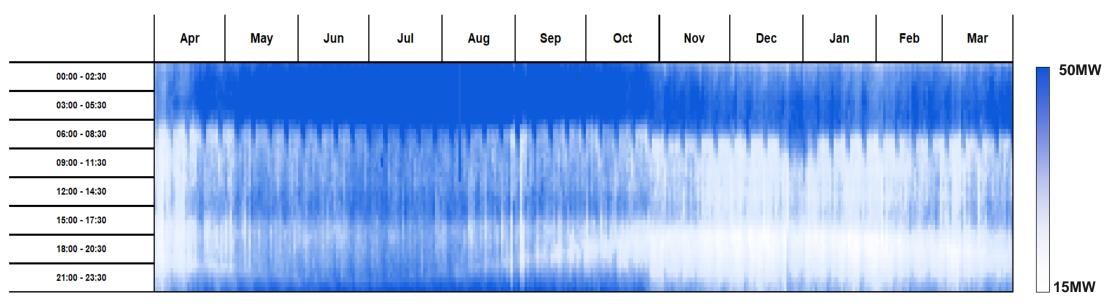
At 10MW all substations are within ratings, however increased scale could risk supplies.

More opportunity for demand turn-up if DNO led and coordinated with local network.

ENZ modelling: Time-profile



Demand turn-up headroom highly dependant on time profile



- ENZ analysis considering half-hourly time-profile to assess headroom at times other than peak
- Strengthens requirement to roll-out secondary substation monitoring for improved network visibility due to variability of customer behaviour at secondary substation level
- Strongly highlights need for coordination at a local level to avoid eroding network capacity headroom

More opportunity for demand turn-up if DNO led and coordinated with local network

ENZ modelling: Time-profile



Summary of key figures

2,500	customers opted in out of 9,447 emailed
20.2 MWh	total turn up across the trial, with 1.68 MW average turn up per event
1.7 MW	average turn up per event
50%	average participation per event
50% 1.4 kWh	average turn up per household per event – 6.1kWh per

Note: Preliminary numbers subject to confirmation. 'Opt ins' are people confirming they wanted to join the trial and formed the group of customers emailed ahead of each event. A customer was judged to have participated in an event when they increased their consumption by the benchmark amount (10%).

Context: The trial's objective was to prove potential of domestic flexibility for local network management and curtailment avoidance



- The challenge: The increasing uptake of Low Carbon Technologies in the home and the rise of variable renewable energy poses challenges for network operators: it gives rise to mismatches in location between where energy is produced and where it is used, and mismatches in time between generation and demand. These mismatches increase stress on local networks, which can ultimately lead to power outages and greater costs to maintain and manage the network.
- Existing solution: Networks have sought to mitigate this through curtailment and active network management (ANM) but this can affect renewable returns and use.
- Proposal: The SPEN Turn Up trial aimed to prove the potential of domestic demand shifting as a cost-effective solution to help grid operators manage network stress while increasing the amount of utilised renewable energy.
 - It took place in Dumfries & Galloway on the SPEN network an area that has amongst the highest proportion of renewable generation connected within the UK relative to its own local energy demand.
 - The trial ran in partnership with Octopus Energy (OE) and targeted 6 separate events, each looking to enact a bulk demand turn up of a portfolio of domestic customers in response to market signals communicated by SPEN.
 - These test events lasted for two hours between either 5:30am-7:30am or 7:30pm-9:30pm. 0

Event dates and times

7:30pm - 9:30pm	5:30am - 7:30am
Event 1 - 17th March 2022	Event 2 - 26th March 2022
Event 3 - 29th March 2022	Event 4 - 10th April 2022
Event 5 - 13th April 2022	Event 6 - 23rd April 2022





Trial process: Customers were dispatched day-ahead and received a reward if the 10% turn up target was met

> Pre-Event Event Post-Event

OE emailed all **9,400 customers** in the DG/KA postcode area with trial information and an opt-in request. Those who opted-in became part of the 'trial group'. Both smart and non-smart tariff customers were targeted.

OE calculated a forecast of consumption by looking at the last four weeks of weekdays before the event and set a baseline at average demand.

By **4pm day-ahead**, OE emailed all customers in the trial group with their turn up target. This was calculated as 10% of the customer's forecasted consumption (the baseline) for the event period.

Before the 19:30-21:30 events, OE sent a reminder email to the trial group.

OE calculated the turn up response as the difference between actual demand and forecasted demand. Customers who successfully reached their target were deemed to have 'participated' and received a reward: free electricity if they turned up above 10%, or double this credit if they turned up by 100%.

OE provided a post-event summary of demand response to SPEN including participation rate and depth of response.

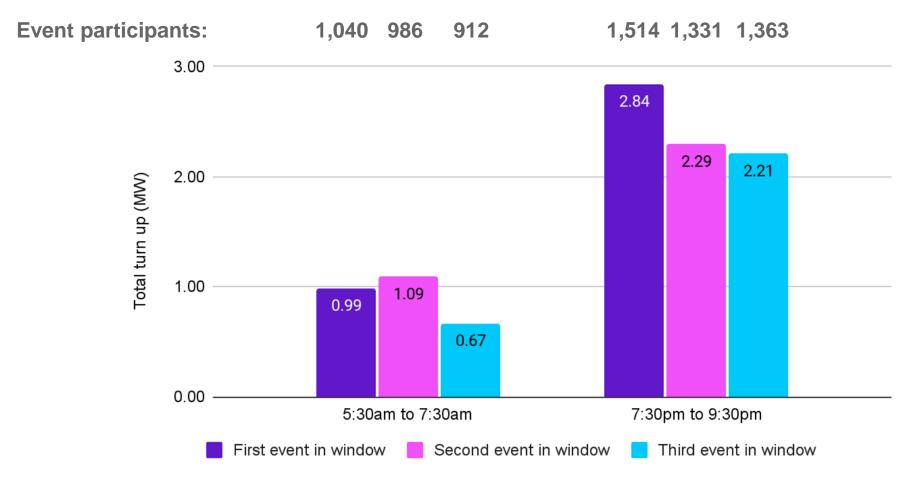


Headline statistics



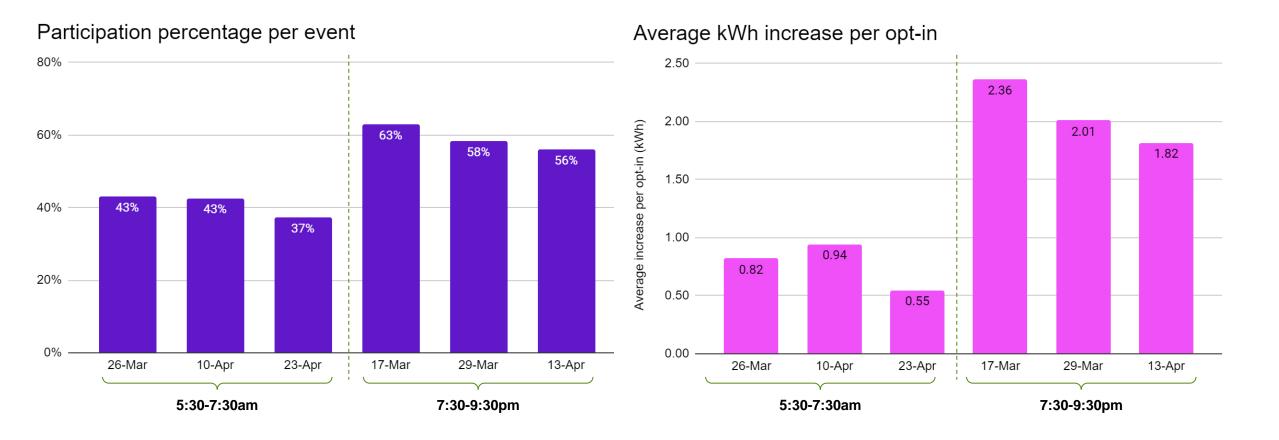


Customers turned up an average of 1.7 MW across trial events Average 2.4 MW in evening 7:30-9:30pm, 0.9 MW in weekend morning 5:30-7:30am



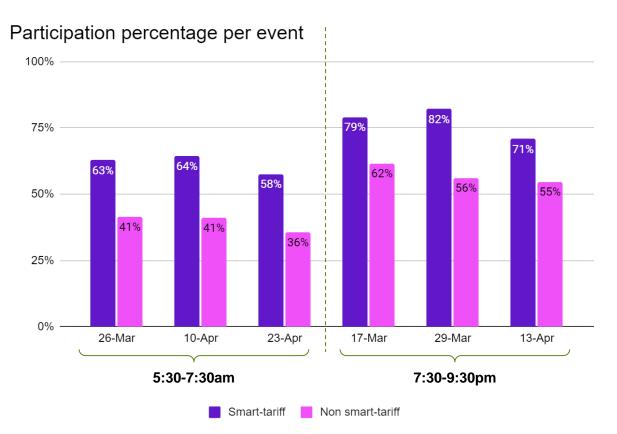


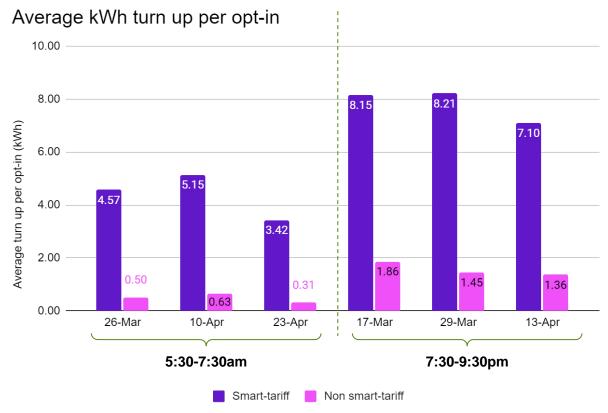
Average participation & kWh increase per event was higher in the evening window, where email reminders were sent 30-minutes pre-event





Average participation & kWh increase per event was higher for smart tariff customers, who are more likely to own low-carbon technology







Demand increase was highest in the Thornhill (DG3) and Moffat (DG10) postcode areas

The most populated region, 56.50 KA3, recorded an average 2.00 KA12, KA27 and KA28 turn up per hhold of 1.47 kWh 56.25 recorded the lowest - 1.75 average kWh response DG10, DG3 and per household: 0.24 kWh 56.00 KA24 recorded the 1.50 highest average 55.75 response per 1.25 응 household: 2.15 kWh 55.50 1.00 55.25 0.75 🕏 55.00 0.50 54.75 0.25 54.50 -3.0 -2.5

Postcode regions in DG/KA ranked by average kWh turn up per household

ranking	postcode	turn up	count of mpans
1	DG10	2.18	13
2	DG3	2.16	16
3	KA24	2.10	28
4	KA6	2.05	77
5	KA26	1.97	30
6	DG5	1.93	27
7	DG8	1.85	44
38	KA8	0.92	65
39	KA16	0.73	14
40	KA2	0.71	36
41	DG16	0.66	25
42	KA12	0.63	68
43	KA27	0.11	2
44	KA28	-0.04	1

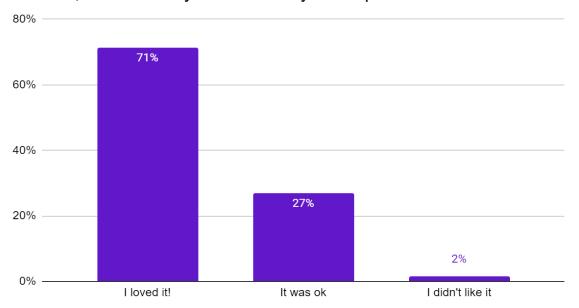




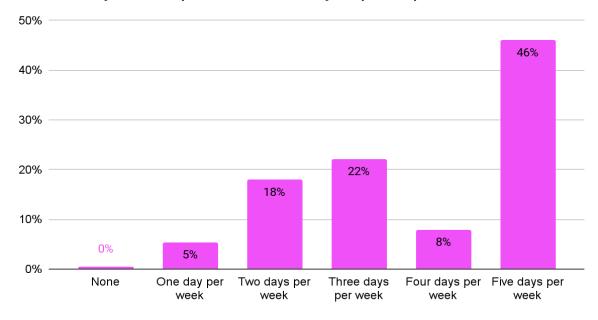
71% of respondents were pleased with the trial and 76% would participate in three or more events per week

- At the end of the trial, a questionnaire was sent out to all customers who had opted-in to the trial to help better understand general sentiment.
- The charts below are based on the answers from **240 customers** who responded to the questionnaire.

Overall, how would you evaluate your experience with the trial?



How many events per week would you participate in?





Event Profiles

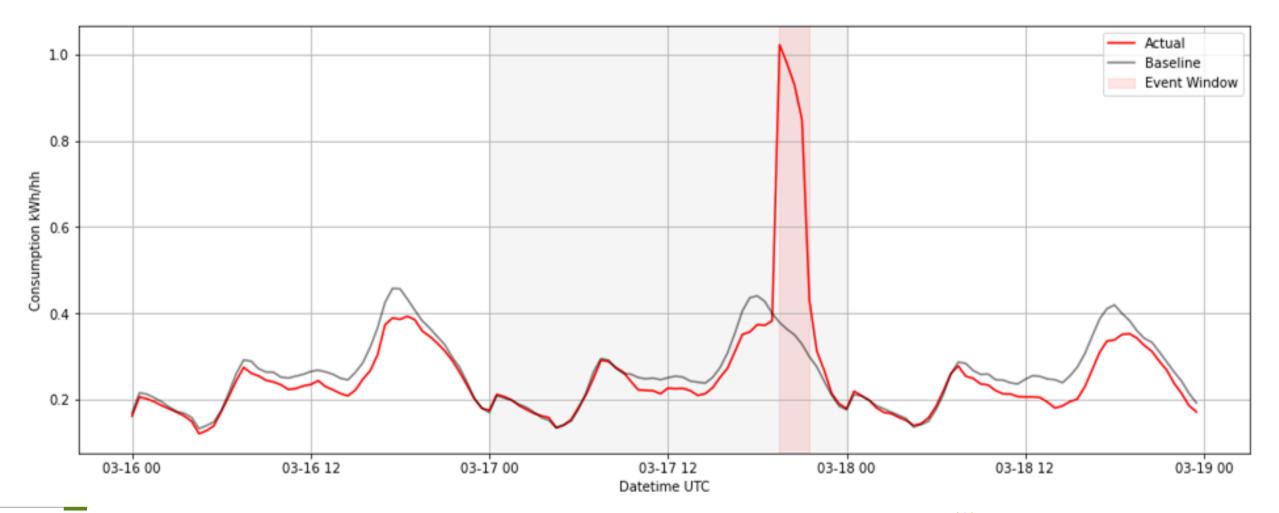
There are no clear troughs in the days either side of the event day, suggesting demand was destructed rather than shifted



Event 1: 17/03/22 19:30-21:30

Actual: 36.9 kWh Baseline: 37.4 kWh

Actual (event only): 3.78 kWh Baseline (event only): 1.42 kWh

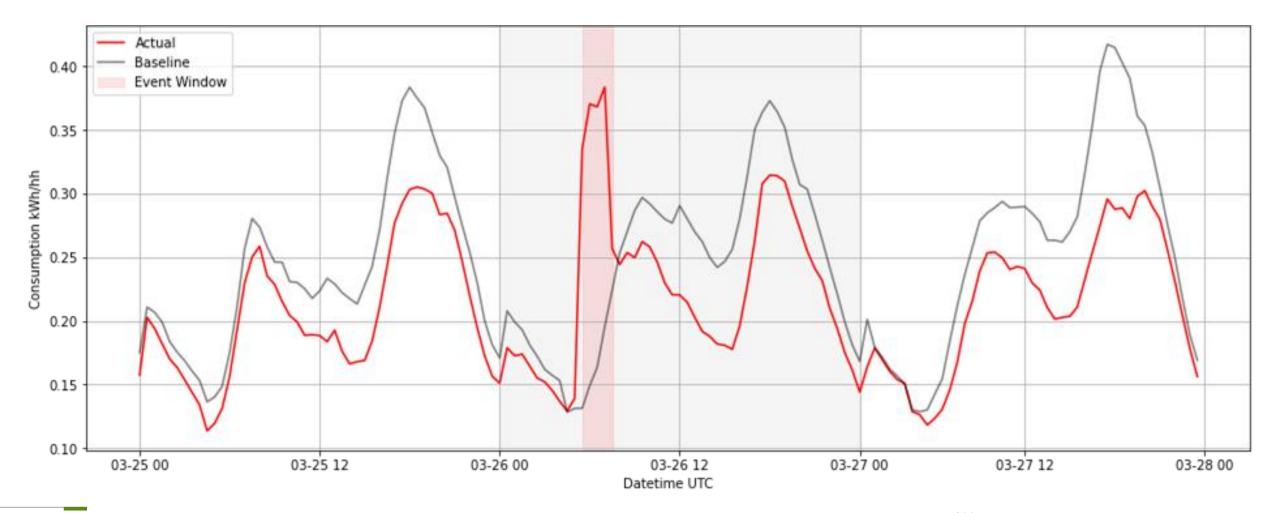




Event 2: 26/03/22 05:30-07:30

Actual: 30.6 kWh Baseline: 35.2 kWh

Actual (event only): 1.46 kWh Baseline (event only): 0.64 kWh





Ralph Eyre-Walker, Innovation Lead, ED2 Team

Innovation Project Update: APPEAL

Environmentally Acceptable Wood Pole Pre-treatment Alternatives to Creosote

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What is the project?

Two preservatives being trialled:

- RV-WR: boron free copper product with mineral oil added to provide water repellency, (supplied by Rundverke)
- Lonza Tanasote: a new copper hot oil-based (non-VOC solvent) high performance product (supplied by Lonza)

Two pole sleeves being trialled:

- CAPTURA
- Polesaver

"Accelerated aging" timber stakes in fungal cellar. One year in cellar = 10 years in field (approx.)

Project Partners: SP Energy Networks (lead), UK Power Networks, Scottish and Southern Electricity Networks, Northern Powergrid



Industry leading project that will directly influence future policy





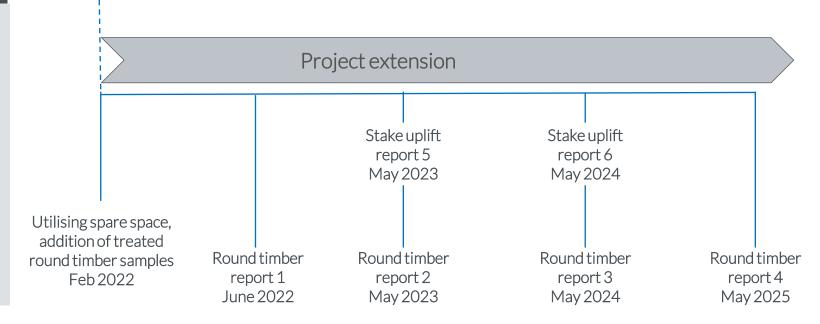
European ban on use of Creosote as a preservative for new poles is expected early-ED2. (Already banned for public areas)

We are intending to lead the change and be the first DNO to stop purchasing Creosote poles at the start of RIIO-ED2.

Benefits of extension

Increased timeframe for original timber stake trial: additional two years represents an "in the field" increase from approx. 40 years to 60 years

Round timber trial: Provides comparison of decay rates between timber stakes and round timber samples. Addition of new treatment (Koppers/Scanpole product)







Treatment	Orig. Sampling Period 1: Test Stakes (1 YR)	Orig. Sampling Period 2: Test Stakes (2 YRS)	Orig. Sampling Period 3: Test Stakes (3 YRS)		Orig. Sampling Period 4: Test Stakes (4 YRS)		Total
			3 YRS	4YRS	5YRS	6YRS	
Creosote (E)	16	16	8	8	8	8	64
RV-PWR T (E)	16	16	8	8	8	8	64
Lonza T (E)	16	16	8	8	8	8	64
Untreated Control (E)	16	16	8	8	8	8	64
Creosote (SE)	16 (8/8)	16 (8P/8C)	16 (8P/8C) 16 (8P/8C)				64
RV-PWR T (SE)	16 (8/8)	16 (8P/8C)	16 (8	P/8C)	16 (8P/8C)		64
Lonza T (SE)	16 (8/8)	16 (8P/8C)	16 (8	P/8C)	16 (8P/8C)		64
Untreated Control (SE)	16 (8/8)	16 (8P/8C)	16 (8	P/8C)	16 (8P/8C)		64
Creosote (NE)	16	← Stakes (64) retained for test comparison – not exposed to the soil bed					16
RV-PWR T (NE)	16						16
Lonza T (NE)	16						16
Untreated Control	16						16
Total Stakes in Test	192	128	32	96	32	96	576
Stakes in Soil Bed	128	128	32	96	32	96	512
Sub-Samples – BS 373	384	256	64	192	64	192	1152

Key:

(E) – Treated pole sections exposed to the soil bed

(SE) – Treated and sleeved poles sections exposed to the soil bed

(NE) – Treated timbers not exposed to the soil bed but used for direct statistical comparison with respective E and SE samples

Untreated Controls – These pole sections serve as the decay tester timbers





Untreated control stakes at 48 months: evidence of fungal decay and very significant timber loss. 50% failed completely at ground level during uplift.



Creosote treated unsleeved stakes at 48 months: no overt indications of decay noted on these stakes.





RVP treated unsleeved stakes at 48 months: no overt indications of decay were noted on these stakes.



Tanasote treated unsleeved stakes at 48 months: no overt indications of decay noted on these stakes.



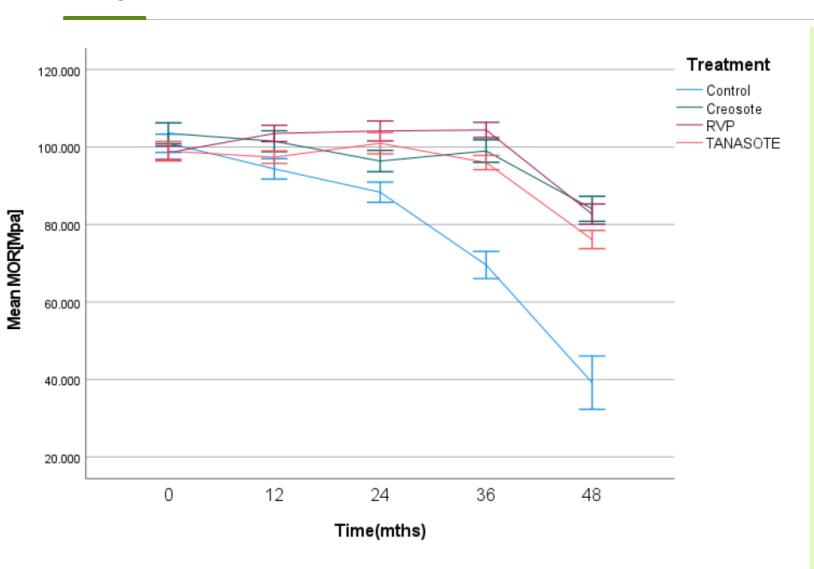


CAPTURA untreated control stakes at 48 months: small zone of decay above the sleeve neck, otherwise no overt indications of decay noted.

Polesaver untreated controls showed some decay areas. However, these are not representative of normal field usage as the decayed areas aligned with where the seam of the sleeve was located. On a full size pole, the seam would be sealed effectively.

No other overt signs of decay on any of the CAPTURA or Polesaver sleeves.





Breaking Tests: graph illustrates the results of Modulus of Rupture (MOR) breaking tests for unsleeved stakes.

Conclusions at this stage:

- No preservative is statistically outperforming any other after 48 months exposure.
- Evidence at this stage indicates that barrier sleeves provide an advantage for untreated or Creosote poles, but not the newer preservative types.
- The decay chamber is performing adequately and we are seeing an effect equivalent to 25-35 years in the field.



Rachel Shorney, Stakeholder Engagement Manager

Energy Data Hub

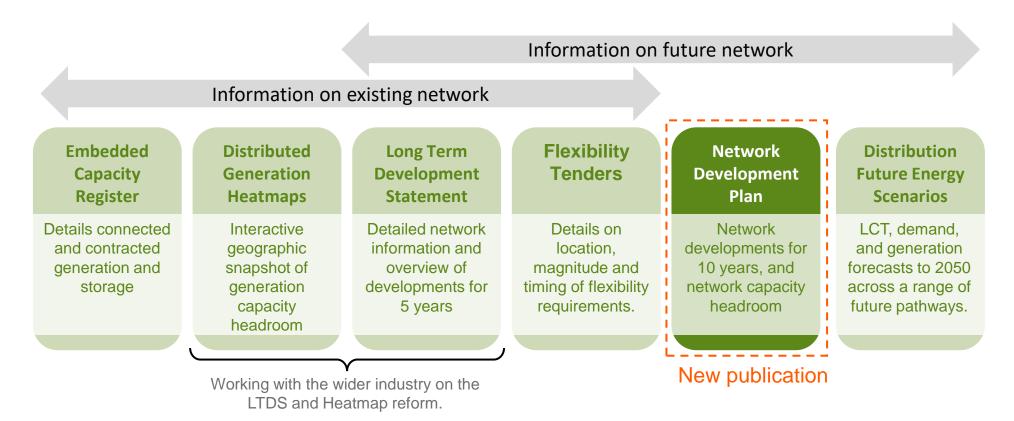
Network Development Plan published

Develop a network that is ready for Net Zero Be a trusted partner for customers, communities and stakeholders Ready our business for a digital and sustainable future

We are proud to have published our Network Development Plan (NDP)



Our **Network Development Plan** is a new publication, including a 10 year view on network developments and a longer term indication of capacity headroom across the range of Net Zero future pathways.



Additional data publication to support our stakeholders in their planning and decision making processes.

Our Energy Data Hub can be found at: spenergynetworks.co.uk/energy_data_hub

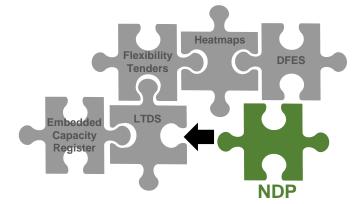
Enhancing stakeholder visibility with our NDP

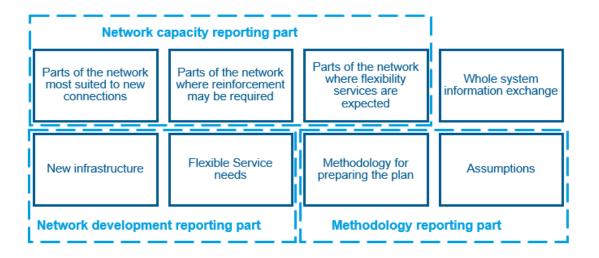


NDP aims to provide stakeholders with transparency on:

- 1. baseline view of planned network developments up to 10 years; and
- 2. network constraints and capacity headroom.

This presents the baseline view of planned asset and flexibility interventions in the 5-10 year period.





- Part 1 Capacity reporting: Update to our 2021 Network Capacity Headroom Report.
- Part 2 Network development reporting: Based on our RIIO-ED1 and RIIO-ED2 intervention plans.
- Part 3 Methodology report: Building on our FSS and LRE Strategies.

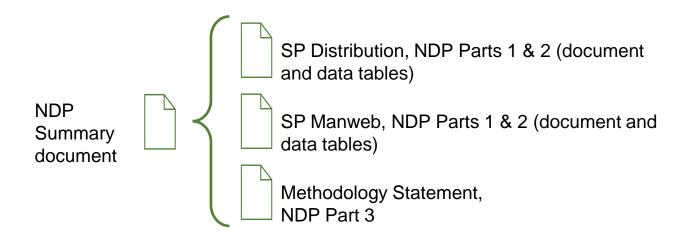
NDP brings together network data (LTDS), long-term forecasts (DFES) and our intervention plan to provide transparency on capacity headroom

NDP Key Details

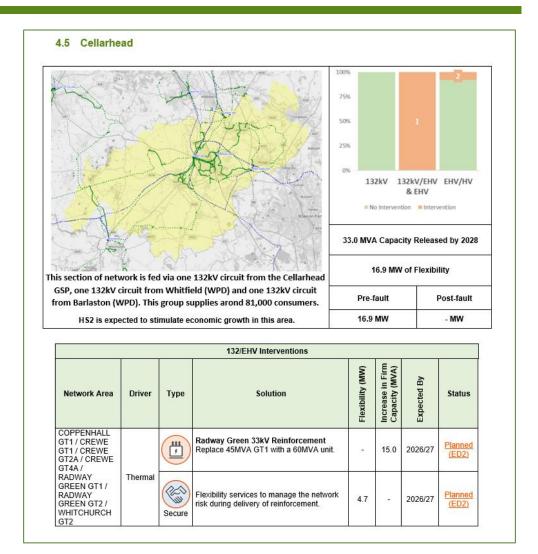


Data and long-term forecasts are key enablers to facilitate decarbonisation.

Publication structure:



Our Network Development Plan (NDP) can be found at: spenergynetworks.co.uk/NDP



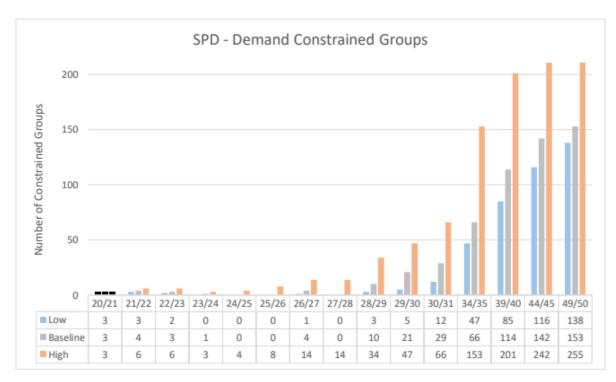
NDP Part 2 – Demand capacity headroom

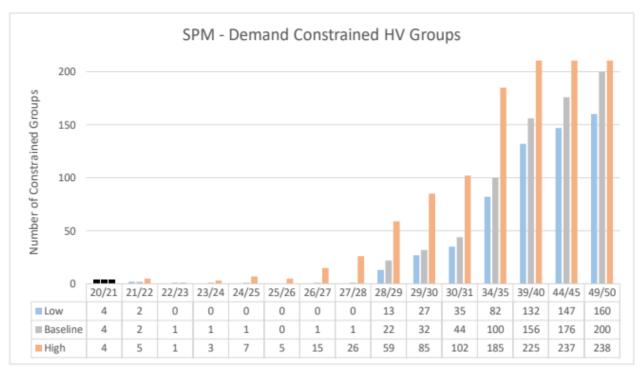


We have calculated network capacity headroom by combining existing network capacity, planned interventions, and forecast demand and generation growth.

The results paint a vivid picture – without additional capacity, customer demand and generation growth will overwhelm network capacity.

The investment we need is detailed in our ED2 Plan so we can provide our customers with the capacity they need.





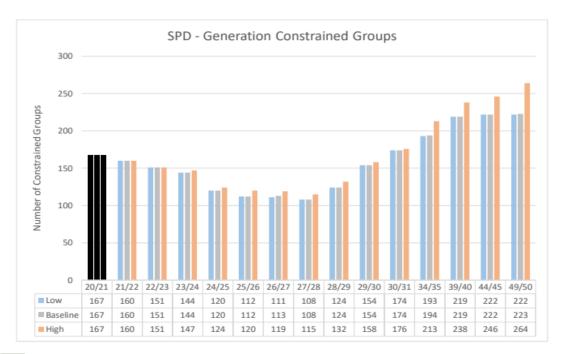
NDP Part 2 – Generation capacity headroom

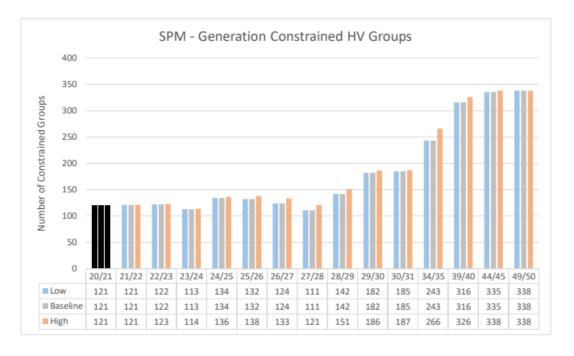


The figures below show the number of primary substation groups with no spare firm capacity. However we are enabling generation to connect to some of these primary substation groups through flexible connection arrangements such as ANM and AFLM.

As these show constrained primary substations, these constraints will likely not impede larger-scale generation where this connects to 33kV or 132kV network assets.

It is unlikely these will impede domestic (<50kW) generation given its minimal contribution to network constraints.





ED2 – Net Zero Modelling

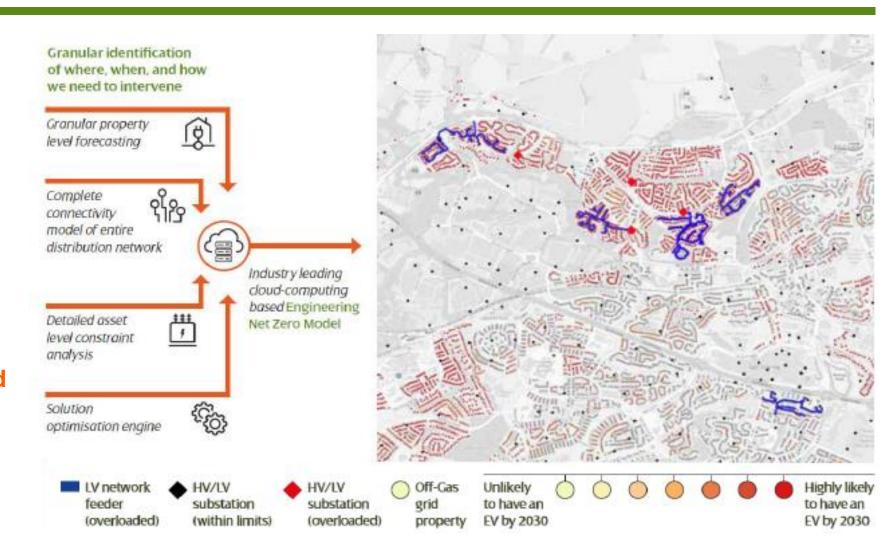


Models developed of the entire network to assess forecast demand on every asset.

These models require

Microsoft Azure servers to
analyse over 175k iterations
per network asset.

Models need to be **integrated** with network monitoring and **corporate systems** to replace 'paper-based' design.



In **ED2** the levels of **intervention** at LV will be over **10 x** the levels of the **last 10 years**.

ED2 – Strategic Optimiser proposal



Building on the success of our EV modelling in ED1 - we are proposing a strategic role for DNOs in Transport and Heat in our ED2 Business Plan

By supporting the roll-out of EV chargepoints, decarbonisation of other modes of transport, energy efficiency, domestic heat pumps and heat networks

Our proposal will deliver significant wider Whole System benefits for all customers in the form of optimised costs and accelerated connection times.

It will also ensure a 'Just Transition', as we will support communities which would otherwise be left behind by a market led model.

If successful, the ED2 plan is to:

- 1. Work with Local Government Authorities and Transport Bodies to undertake detailed DNO-led Optioneering works, to ensure the optimal and cost effective siting of public EV Chargepoints.
- 2. Act as a 'Provider of Last Resort' for public EV ChargePoints where the market fails to deliver (i.e. in areas which aren't currently commercially attractive to market providers).
- 3. Set up a team of 'Strategic Optimisers' to act as contacts for Local Authorities to ensure alignment of Network and Local Area Energy Plans (LAEPs).
- 4. Work closely with stakeholders to carry out additional assessments and analysis to create a strategic plan for future energy infrastructure, supporting the delivery of the Regional Energy Strategies and Local Area Energy Plans.



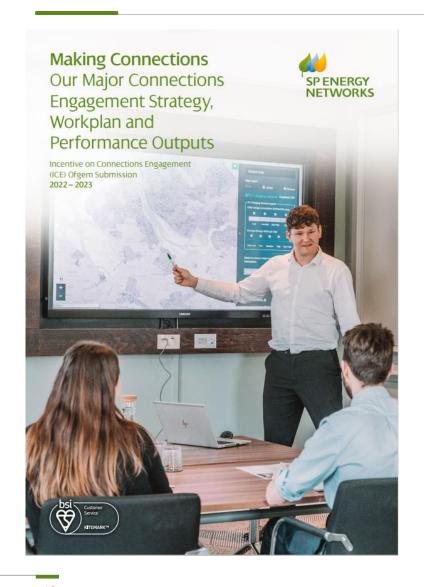
Rachel Shorney, Stakeholder Engagement Manager Stuart Walker, Customer Engagement Manager

Incentive for Connections Engagement Actions Completed in 2021/22

Develop a network that is ready for Net Zero Be a trusted partner for customers, communities and stakeholders Ready our business for a digital and sustainable future

ICE Looking Back Report 2022/23





We are proud to publish our 2022/2023 ICE Plan.

This also highlights the improvements we have made in the last 12 months for our connections customers.

spenergynetworks.co.uk/pages/incentive_on_connections_engag ement_ice_submission.aspx

Key improvements in the Looking Back Report include:

- Policy Guidance Documents published
- Design Support Guidance Documents published
- Project Management templates developed

Further information in this afternoon's session on Partnerships and Project CHARGE ConnectMore Interactive Maps.





28 SPEN Policy Documents published in 2021/22 at spenergynetworks.co.uk/documentation

- All 1,750 registered stakeholders emailed the details of these new policy documents.
- Additional training available for new policy documents if required.
- If the document you are looking for is not listed, you can complete the <u>Online Request Form</u> to request additional information
- We will be publishing further policy documents this year.
- Should you be unable to locate the required policy, procedure or specification please contact your SPEN Design Engineer or Project Manager or gettingconnectedupdates@spenergynetworks.co.uk



ICE – Design Support



Design Information Guidance Pack published at: spenergynetworks.co.uk/newsletters Design Information

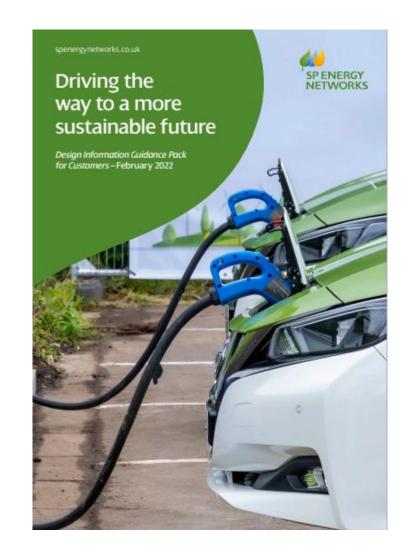
• Guidance Pack emailed to over 2,100 registered stakeholders

ADMD Calculator published at: spenergynetworks.co.uk/ newsletters

ADMD Calculator emailed to 812 registered stakeholders.

LCT Examples Information Pack updated and published at: spenergynetworks.co.uk/ newsletters

Information Pack emailed to over 2,100 registered stakeholders.



ICE - Project Management templates



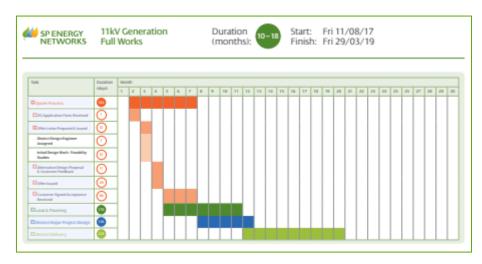
MAJOR PROJECT TEMPLATES

The project management templates provided on this page are for guidance only. The timescales published are indicative of typical historical projects delivered by SP Energy Networks; however every project is unique therefore YOUR timescales could vary significantly depending on your specific project.

- 11kV Generation
- 33kV Generation Full Works
- 33kV Generation POC (Point of Connection)
- 11kV Generation POC (Point of Connection)

These can be found at:

www.spenergynetworks.co.uk/major_project_templates





Internal Use



Rachel Shorney, Stakeholder Engagement Manager Stuart Walker, Customer Engagement Manager

Incentive for Connections Engagement Questions and Feedback

Develop a network that is ready for Net Zero Be a trusted partner for customers, communities and stakeholders Ready our business for a digital and sustainable future

ICE – Questions and Feedback



Website

We have recently updated our SP Energy Networks website to bring the work we do for our major connection customers into a more prominent position on the Getting Connected part of our website.

We plan to make further enhancements to our website over the next 6 months and would welcome feedback to help us shape a platform that is beneficial to all customers and stakeholders.

If you would like to make suggestions for any further improvements you feel would prove beneficial.

Please contact us on gettingconnectedupdates@ spenergynetworks.co.uk

Open Door Policy

Due to the ongoing COVID-19 pandemic, we will be continuing our Open Door Policy via telephone or using MS Teams or Zoom.

We are keen to engage with any stakeholder and customer in any way they choose despite the lack of face to face meetings at present.

Please continue to contact our teams in both licence areas using the Areas of Responsibility information at the back of his document, or the Contact Us page of our website, which can be found at:

spenergynetworks.co.uk/ contactconnections

Email Communications

We continue to look for new ways to communicate with our stakeholders, and we have increased our email communications to our registered stakeholders during the ongoing COVID-19 pandemic.

Stakeholders have told us that this increased communication has been appreciated, and we plan to deliver further communications in this manner.

Please register as a stakeholder with us if you would like to receive ongoing communications and updates in this format.

Register as a stakeholder: spenergynetworks.co.uk/register

Dates for the diary



Dates for the diary in 2022/23: 03/08/22 Customer Contact Focus Group 17/08/22 RAdAR Working Group

14/09/22 Preparing for Net Zero Conference

Please register for our next events at: spenergynetworks.co.uk/stakeholder events

Thank you for your time today.

Your feedback has been useful and we will incorporate your comments when planning our next engagements.

Please register as a stakeholder if your would like to receive further updates from us:

spenergynetworks.co.uk/register