14 October 2019

Northern Powergrid Webinar

Maximising the value of EVs for our customers

Introducing the speakers

Anda Baumerte
Sustainability Manager

Paris Hadjiodysseos
Smartgrid Development Engineer

Joined by for the questions and feedback section:

Iain Miller
Head of Innovation

Helen Priestley
Stakeholder Manager

Agenda

1. Introduction
   - Our business
   - Types of stakeholder engagement we host
   - EV trends in our region
2. Maximising the value of electric vehicles for our customers
   - EVs in smart and flexible energy system
   - Get connected
   - Future developments
3. Future events and engagement opportunities
4. Questions and feedback

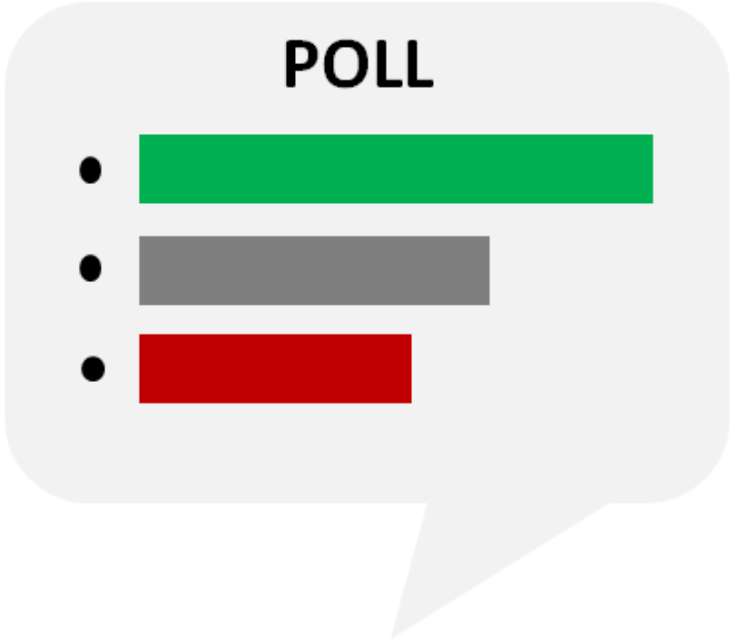
Format

- 15 to 20 min presentation followed by Q&A
- Listening mode only for participants
- Give feedback or ask questions at any point during the webinar using the question bar on your screen
- Take part in polls
- Your questions will be answered at the end of the presentation or followed up on after the session
- Send any feedback on today's webinar to yourpowergrid@northernpowergrid.com

Live Poll

Help us to tailor the content of today's webinar, are you a...?

A. Consultant
B. Local government representative
C. Fleet manager
D. Chargepoint installer
E. Working for other utilities
F. Other



Introduction

Northern Powergrid

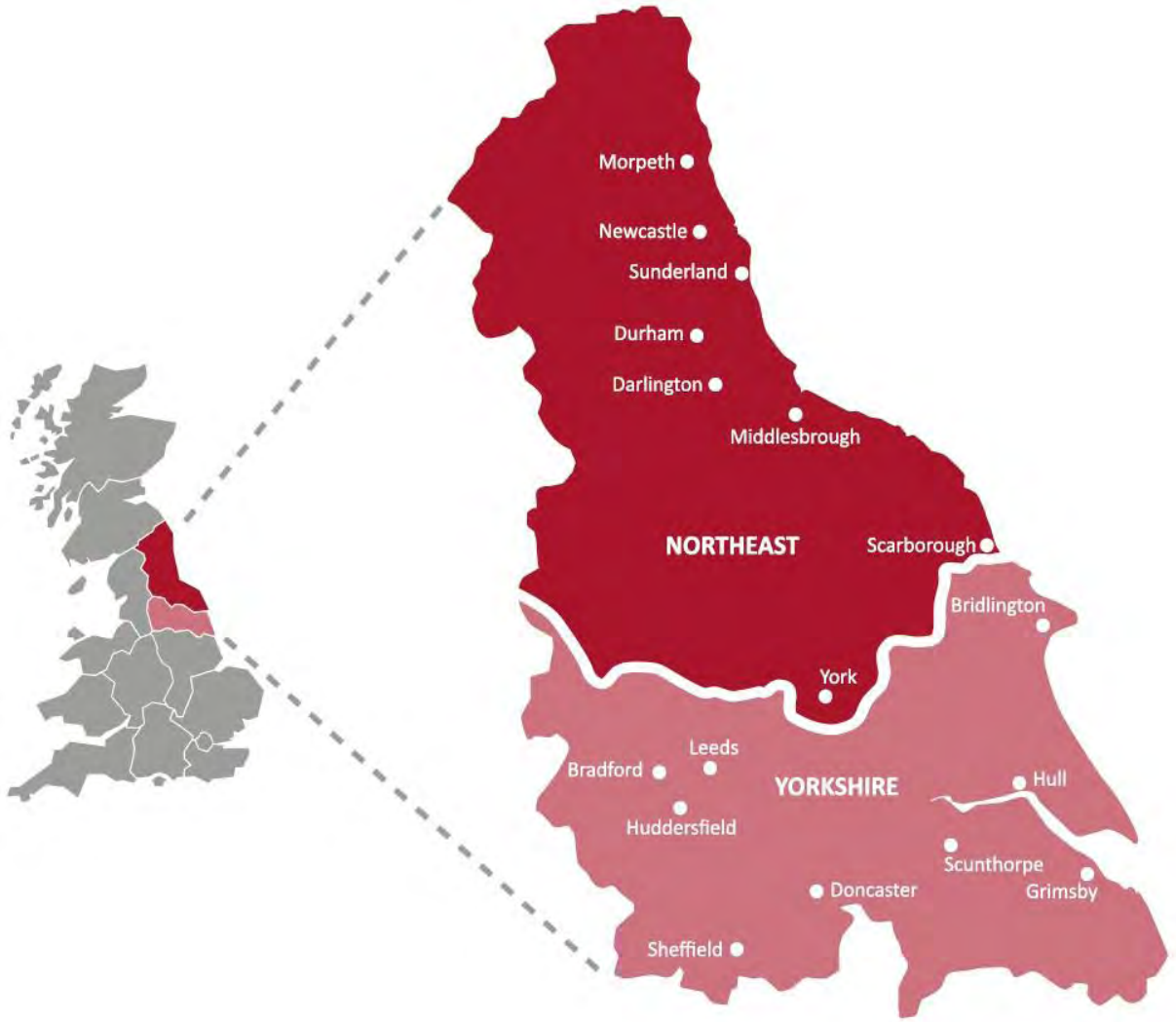
We are:

- Ofgem regulated ‘wires-only’ electricity distributor
- 95,000km of overhead lines
- 25,000km^2 of underground cables
- 63,000 substations

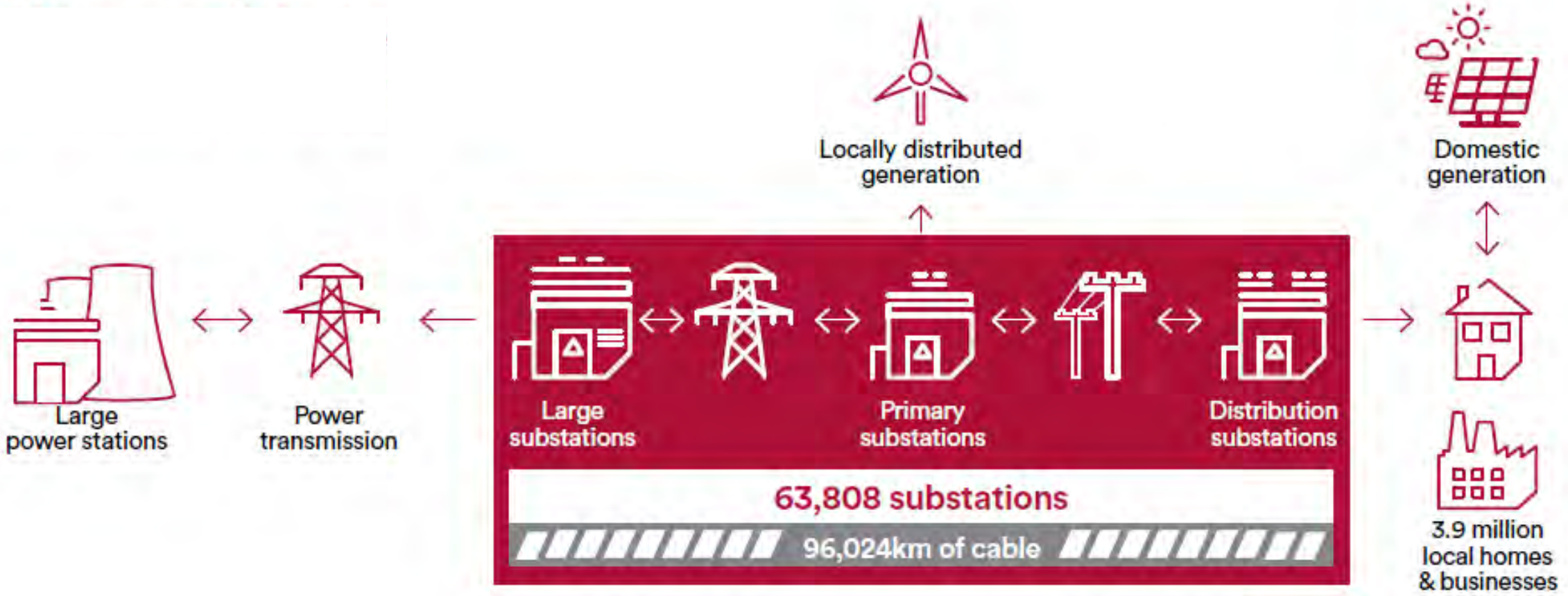
We serve:

- 3.9 million homes & businesses – a population of 8 million
- 2,900 employees
- 3 of the UK’s 10 biggest cities, 4 national parks and 5 Areas of Natural Beauty

£85 of typical annual domestic bill (23p per day)



Where we fit in the electricity industry



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We have a key role in enabling the electric transport future

We do this through a number of actions:

- ✓ Connection applications or notifications
- ✓ Stakeholder events
- ✓ Support and guidance for new EV connections via our monthly **customer surgeries** and access to our design team experts
- ✓ Meetings with LAs & LEPs to discuss their infrastructure plans
- ✓ Network innovation projects
- ✓ Work with industry and research partners, and policy makers
- ✓ Provision of technical guidance
- ✓ Develop EV connections guide and rationalise our online EV information

Industry leader for electric vehicle solutions

Partnership with Nissan – a leader in EV manufacturing

Silent Power – electric vans restoring electricity supply

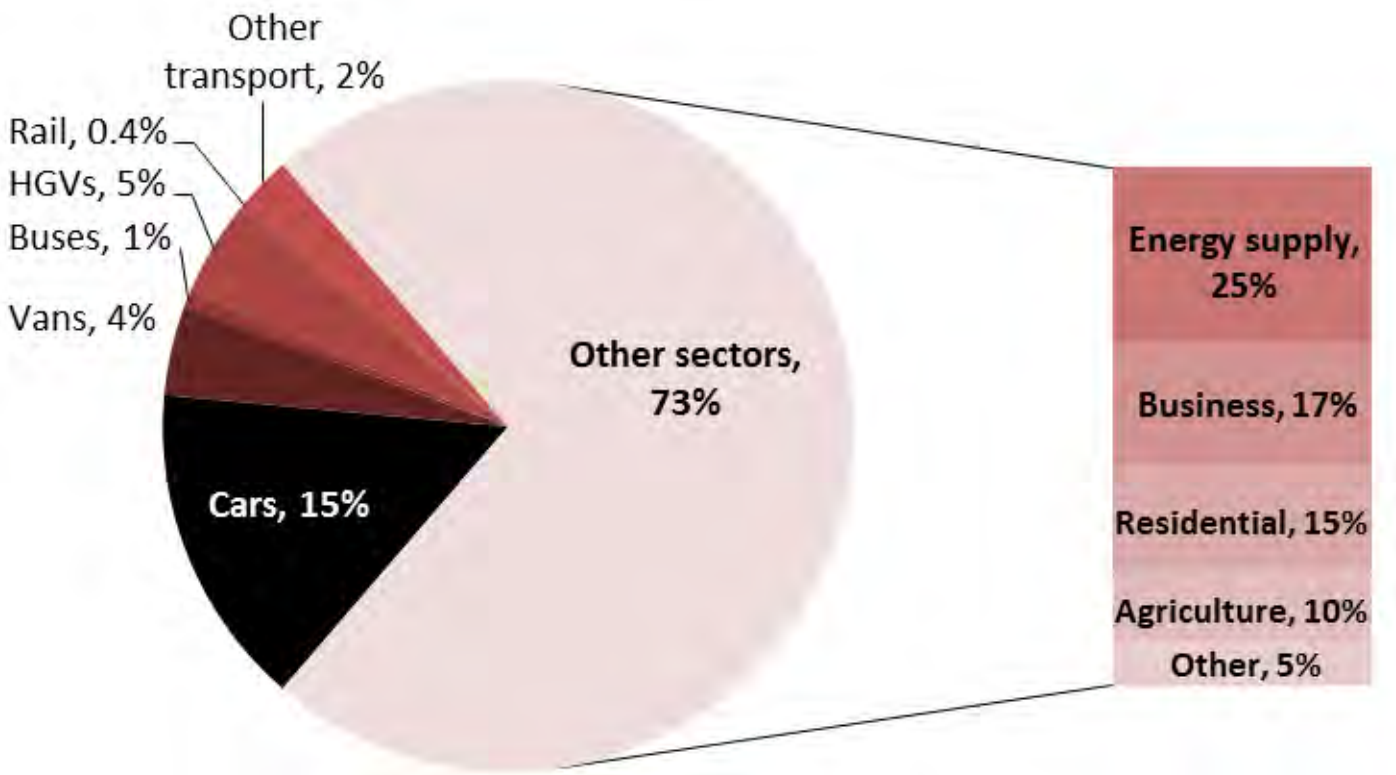
First DNO to start a V2G innovation project

Emissions from transport

Transport accounts for **27%** of UK's greenhouse gas (GHG) emissions in 2017, becoming the largest emitting sector of the UK economy.

Majority of transport emissions today come from cars.

Transport emissions have fallen only by 2% since 1990 levels.



BEIS (2018) Final UK greenhouse gas emissions national statistics 1990-2017.
Other transport includes mopeds and motorcycles, LPG fuelled vehicles, aviation, shipping, and other road vehicle engines. Other sectors (5%) include industrial processes, public sector, waste management, land use, land use change, and forestry.

Driving EVs – UK Policy developments

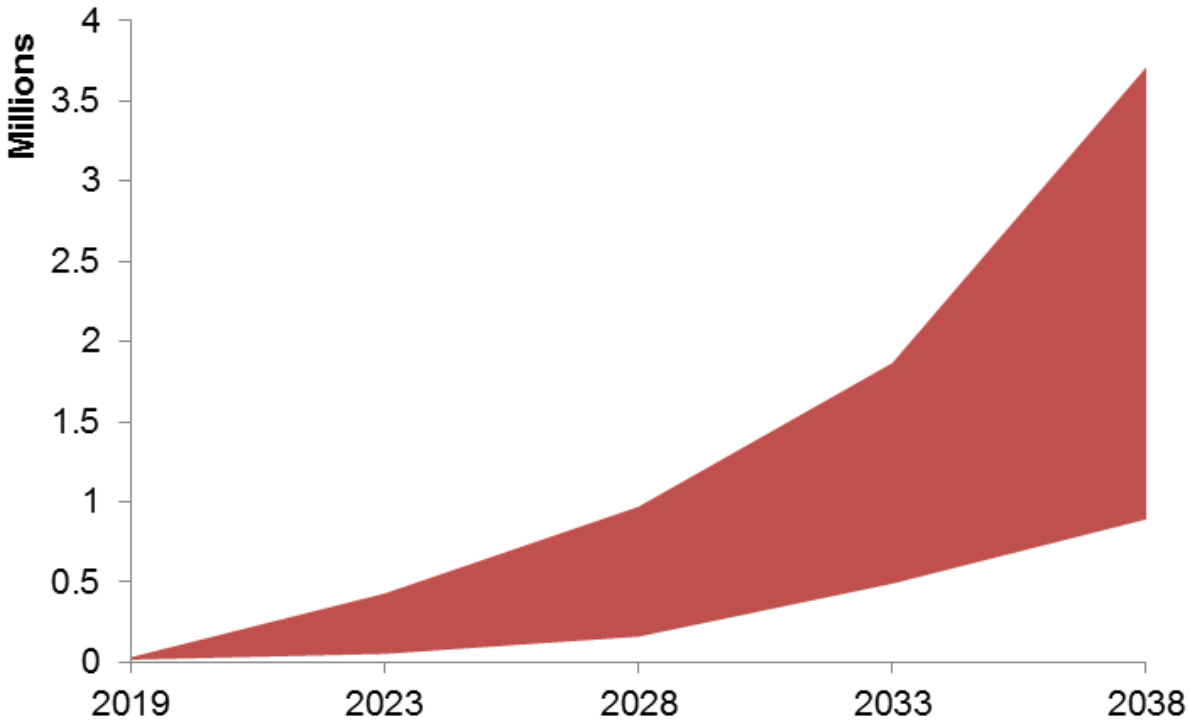
In July 2018, Government published its EV policy:

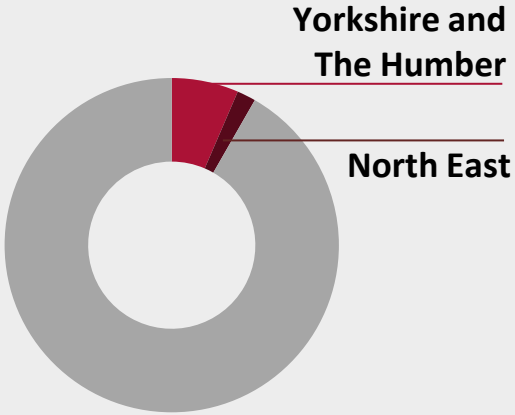
- Road to Zero
- National Infrastructure Assessment
- The Automated and Electric Vehicles Act 2018

This has been further supplemented by:

- Binding Net Zero target
- Financial support for EV infrastructure roll-out
- Ultra Low Emission Zones/Clean Air Zones starting to operate

All of our forecast scenarios show an increase in EV volumes in future





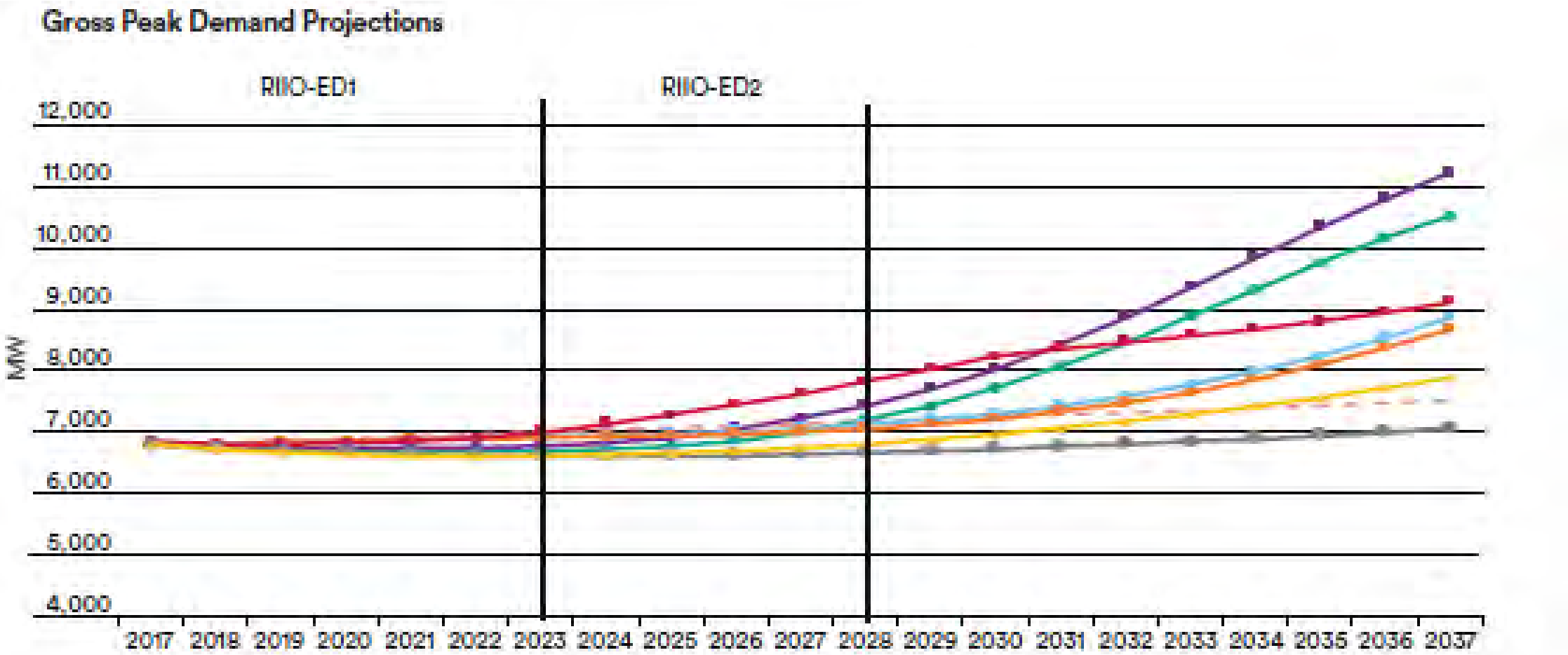
8%

of UK plug-in vehicles are in our region

3,000+

EV charging points have been installed in our region

We use a number of scenarios for load forecasting



Maximising the value of electric vehicles for our customers

Hot off the press

Our **Maximising the value of electric vehicles for our customers** report sets out what Northern Powergrid is doing to enable the electrification of transport – all in one place.

Available at northernpowergrid.com

Selecting the EV charging solution that meets your needs

Our document includes:

- things to consider when selecting your charging solution
- guidance on how to connect charger
- description of the simplified notification & connections process
- specific guidance to Local Authorities and Fleet Managers
- self-service connections' tool in development

	Slow	Fast	Rapid
Power rating	3.5-7kW	7-22kW	43kW+
Electrical supply type	AC	AC and DC	AC and DC
Time to charge (empty to full)	6-11h	2-6h	48-56min or less
Time to charge (typical daily use of 10kWh)*	1.5-3h	0.5-1.5h	less than 15min
Range added in 15min*	3-7 miles	7-23 miles	45-53+ miles

Need advice?

Ask our experts
northernpowergrid.com/contact-our-connections-engineers

Book a surgery
northernpowergrid.com/customer-events-and-surgeries

Charger types – illustrative example

*Based on assumed battery capacity of 40kWh

Get connected

* More capacity may be released following a site specific assessment to determine whether the street light cut-out can safely accommodate the new load under this operating cycle.
**More expensive if the location of the sought connection is far from primary substation.
***Based on assumed battery capacity of 40kWh.

	Unmetered	Small	Medium	Large	Very large
Typical for	Street lighting	Domestic property single phase connection	Small commercial property e.g. petrol station, multi-storey car park, three phase connection	Medium commercial e.g. motorway services, future petrol stations and car parks LV current transformer metered connection	Industrial e.g. factories and future motorway services HV current transformer metered connection
Capacity sought	≤1.4kW*	≤18kW	≤55kW	≤276kW (fuse) OR ≤1.1MW (air circuit breaker	≤8MW
Typical charger power rating	<1.4kW*	up to 7kW	up to 43kW	120-350kW	350kW
Average time to quotation	≤20 working days	5 to 17 working days	17 working days	24-54 working days	24-54 working days
Average time to connect following payment	5 weeks	10 weeks	19 weeks	19 to 29 weeks	29 weeks
Average price	*c.*£600 to £3,000	*c.*£600 to £1,500	*c.*£11,000	c.£11,000 to £95,000	£95,000+**
Time to charge (for typical daily use of 10kW)***	7¼ hours	1 ½ hours	15mins	2-5mins	2mins

Technical design policy updated to ensure clarity on connections

- Reviewed the standard sizes across the whole asset suite
- Clarity on Earthing arrangements
- Diversity factors for domestic chargers ≤ 32A
- Guidance on all other EV charging facilities
  - e.g. unmetered, domestic >32A, non-domestic and public

n^{th} Customer	ADMD (16A EV charger)	ADMD (32A EV charger)
1	7.19kW	9.77kW
25	3.87kW	5.47kW
50	3.39kW	4.83kW
75	3.14kW	4.50kW
100	2.97kW	4.27kW

n^{th} Customer General Domestic plus EV charger ≤ 32A

*After Diversity Maximum Demand

Smart Grid technology

- £83m Smart Grid Enablers programme
- Greater visibility and better understanding of available capacity
- Ability to control our network
- Introduces and enables network flexibility

Smart grid practices and technologies

Primary network	Local network
✓ Self-healing networks	✓ Time-of-use demand data
✓ Real time capacity management	✓ Remote monitoring of LV circuit power flow
✓ Two-way power flow monitoring	✓ Automated control of voltage
✓ Advanced substation control devices	✓ Fault prediction and smart “fuses”
✓ Narrowband flexible communications (IP)	✓ Narrowband communications
	✓ Harvesting network data from existing HV devices

EVs as a key part of our customer flexibility strategy

- Increase value for customers
- EVs can be a solution to flexibility
- Government has a key role
- Smart and flexible toolbox
- Time-of-use tariffs and flexibility work hand in hand
- Use cases for customer flexibility

Cases for use of customer flexibility

Traditional reinforcement	**To defer spending on traditional reinforcement.**
Planned maintenance	**To manage the risk of power cuts during long duration construction periods.**
Emergency support	**To provide emergency support during unplanned power cuts.**

Our innovation projects

Enhancing resilience

- Silent Power
- Microresilience
- Resilient Homes

Customers supporting the grid

- Vehicle to grid
- e4Future
- GenDrive

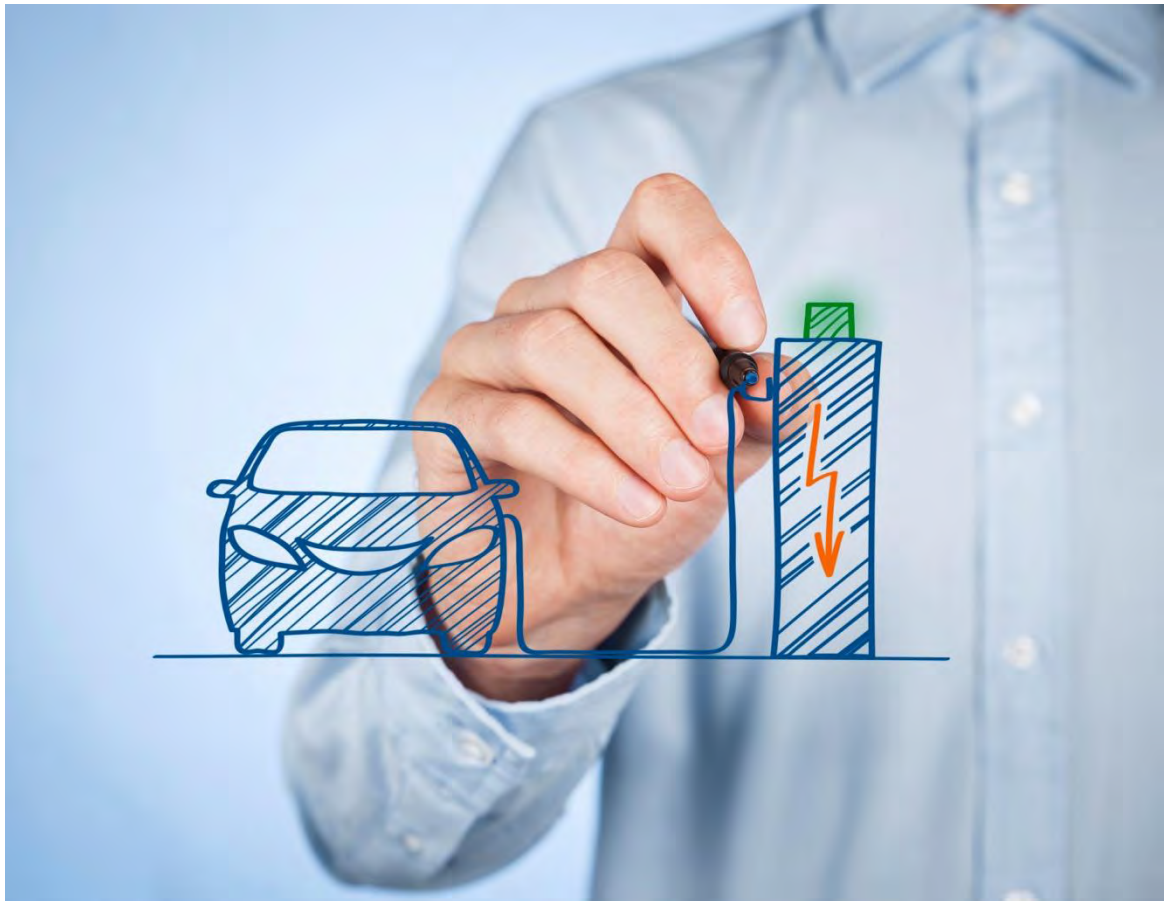
Improving customer service

- LV budget estimating tool
- Impact assessment of LCTs on the design of the LV network

Future developments and engagement opportunities

Industry developments supporting EVs

- Retail market developments
  - the roll-out of smart meters
  - the introduction of half-hourly settlement
  - time-of-use tariff propositions
- Network charging
  - connection charges
  - Use of System charges
- DSO role at the heart of the smart, flexible system
- Enhancing open data



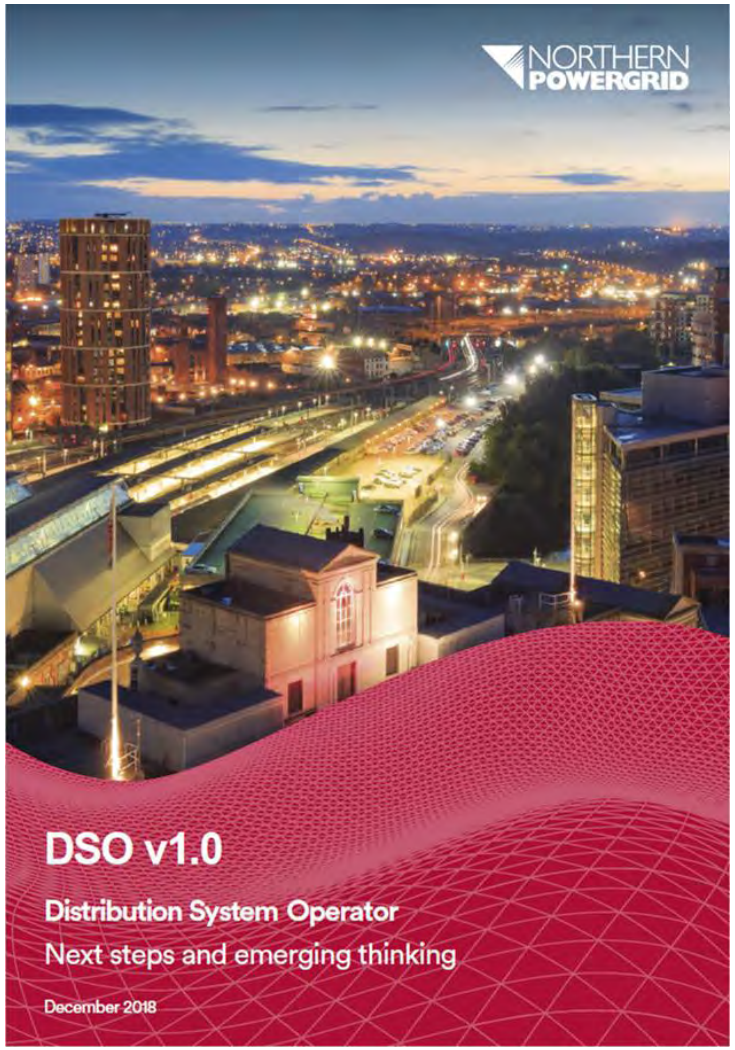
Transitioning to DSO – updating our plans

Our **DSO v1.0** report is in process of being updated, based on our stakeholders' feedback.

It sets out the new role of distribution system operator (DSO) required to:

- coordinate between buyers and sellers of flexibility
- provide visibility and transparency for new flexibility markets

Available at northernpowergrid.com



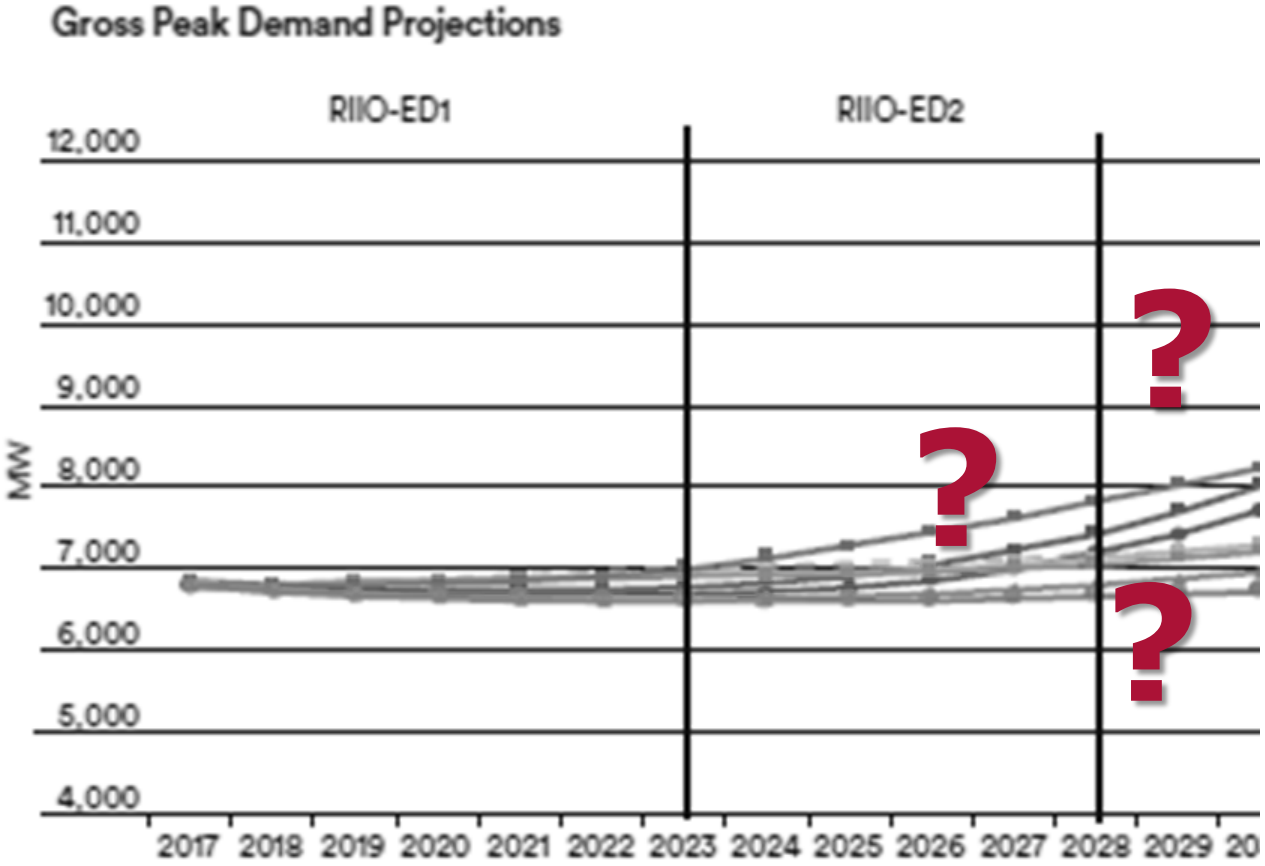
Distribution Future Energy Scenarios

We are committed to publishing our Distribution Future Energy Scenarios (DFES) in December 2019 via the **Open Data Institute – Leeds.**

This paves way for future collaboration:

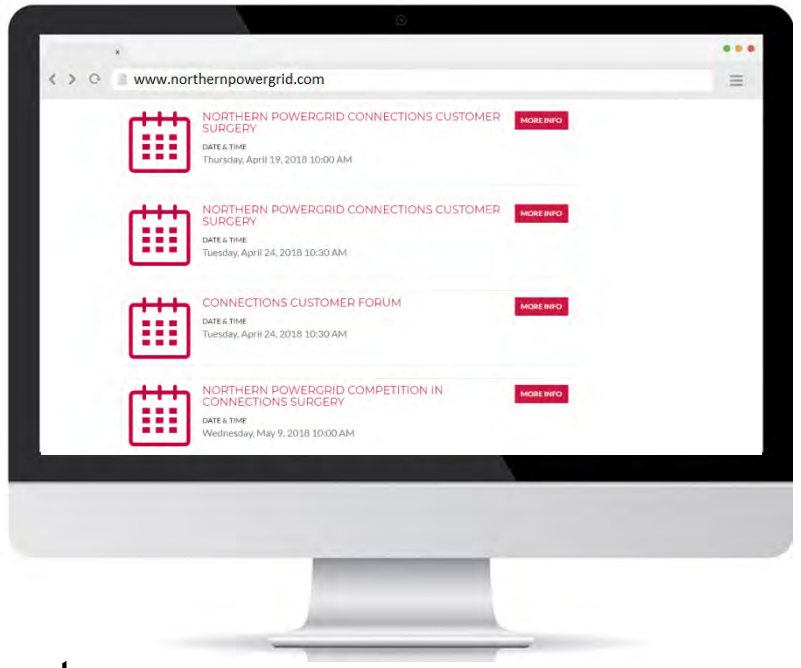
- October 2019 – early engagement
- December 2019 – DFES publication
- Q1 2020 – use and verification of our forecast data

More information at odileeds.org



Opportunities for further engagement

What?	When?
Connections Surgeries	Monthly
Local Authority Forum	25 October 2019
ICP Seminar	8 November 2019
Connections Customer Forum	20 November 2019
Stakeholder Summit	29 November 2019
Dedicated EV Event	February 2020



Events, workshops and connections surgeries are bookable at:
northernpowergrid.com/customer-events-and-surgeries

Questions and feedback

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Live Poll

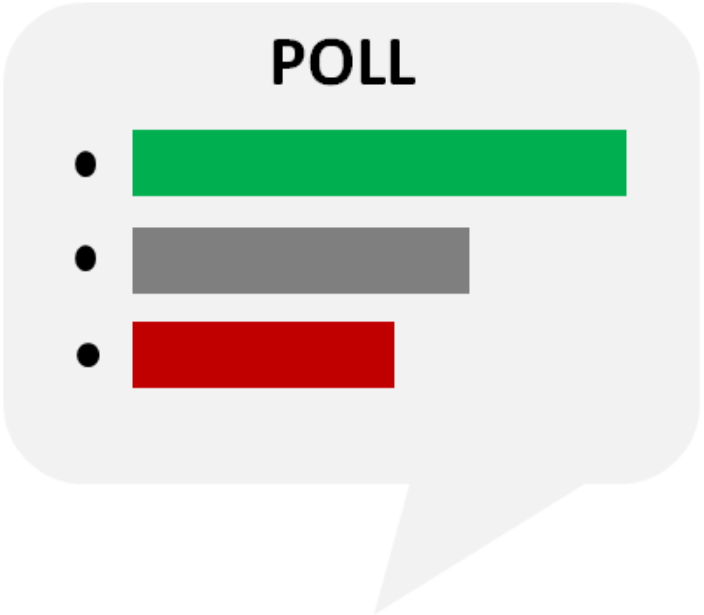
- Has today's webinar improved your understanding of what Northern Powergrid is doing to support the electrification of transport?

  A. Yes

  B. No

  C. Neutral

- What else could we be doing to engage with you on this topic? (respond via the question bar)



Thank you

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