Grid Guide to the **Decarbonisation of Transport**

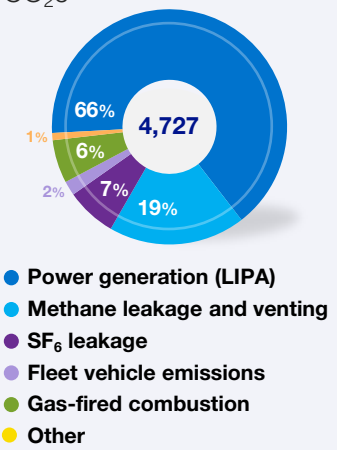
Supplemental Pack

We are committed to reducing our own transport emissions and will enable the transition to clean transport

- Transport emissions account for 2% of our overall Group emissions
- We have made a commitment to move to a 100% electric fleet by 2030 for our light-duty vehicles, and pursue the replacement of our medium and heavy-duty vehicles with zero carbon alternatives
- By the end of 2021, our benefit company cars will also be zero emission too

Reducing our own transport emissions

National Grid emissions by type
kt CO_2e



- We've also committed to achieve zero carbon emissions from business air travel
- From 2020 onwards, we will reduce our annual air miles travelled by at least 50% from a 2019 baseline on an enduring basis, and we will offset any remaining emissions responsibly

- We also play a critical role in enabling the decarbonisation of transport in the UK and North-Eastern US
- In the UK we are
  - Supporting low carbon alternatives
  - Working to be able to operate a zero-carbon network
  - Reinforcing the network and connecting renewables
- In the US we are
  - Delivering EV charging ports to residential and business customers
  - Encouraging EV uptake through infrastructure deployment, fleet advisory services and partnerships with stakeholders
- We are engaging with various stakeholders in the transport industry, like EV100, to make sure we find the most cost-effective solutions for consumers
- We are technology agnostic, here to support all solutions, regardless of technology and fuel

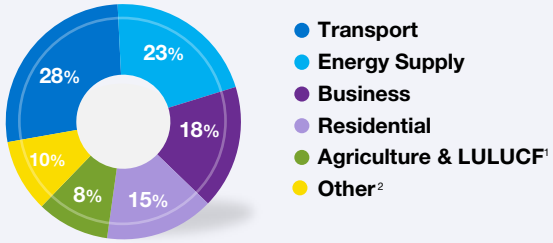
For every 1,000 vehicles we could reduce
10,000 tonnes
of carbon emissions

Decarbonisation of Transport in the UK

The decarbonisation of transport presents a huge opportunity for the UK to reduce emissions, improve air quality and to be a leader in mobility

- Transport is the largest contributor to the UK's carbon emissions

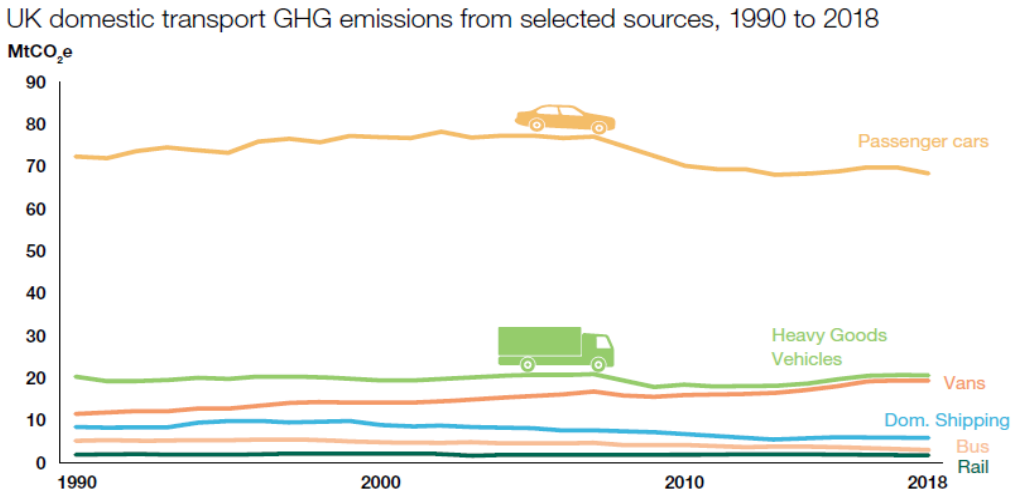
UK Domestic GHG emissions, 2019



1. Includes land use, land use change and forestry
2. Includes public and industrial processes emissions and waste

- Chancellor Rishi Sunak recently announced green transport funding of £1.3 billion, an increase from £500 million in the March 2020 Budget
- Prime Minister Boris Johnson's announcement of a 10-point green plan included an ending of the sale of new petrol and diesel cars by 2030

Passenger cars account for majority of domestic transport GHG emissions



- Significant energy infrastructure is required and National Grid has a critical role to play by:
  - Directly connecting transport hubs (EV rapid charging)
  - Managing the supply and demand (electricity system operator)
  - Supporting alternative fuels, e.g. hydrogen, and
  - Moving energy from clean generation to clean transport

What does the pathway to transport decarbonisation look like in the UK?

All modes of transport need to decarbonise, no matter the scale and complexity

The starting point on the journey to decarbonisation, and the most advanced sector.

This will be accelerated by Project Rapid which has received **£950m** of funding from Office for Zero Emission Vehicles (OZEV) for capacity at **110 MSA's**.

The bus sector is expected to decarbonise quickly and is currently undertaking trials using both electric & hydrogen technologies.

The sector can expect to see charging hubs at depots as operators decarbonise their fleets.

The decarbonisation of HGVs will scale up the demand of electricity, either for the use of vehicle charging or production of green hydrogen.

The rail sector will continue to see further electrification across networks. Hydrogen & battery technology rollouts will help to decarbonise more rural areas where electrification has not been possible.

The maritime & aviation sectors are expected to be the last sectors to decarbonise as they require significant investment and sustainable fuels. Looking forward, ports & airports across the UK can be utilised as charging hubs for road and rail, thanks to our work on the East Coast.

Consumers will only switch to an EV if there are widespread charging points, which are easily accessible, and can charge at appropriate speed

- The most convenient and cost-effective way to address 'consumer range anxiety' is to locate ultra-rapid charging infrastructure at existing Motorway Service Areas (MSAs)
- We have proposed a network of ultra-rapid EV charge points along the strategic road network
- Optimising natural synergies between our transmission infrastructure and the country's transport infrastructure

Proposed fast charging network

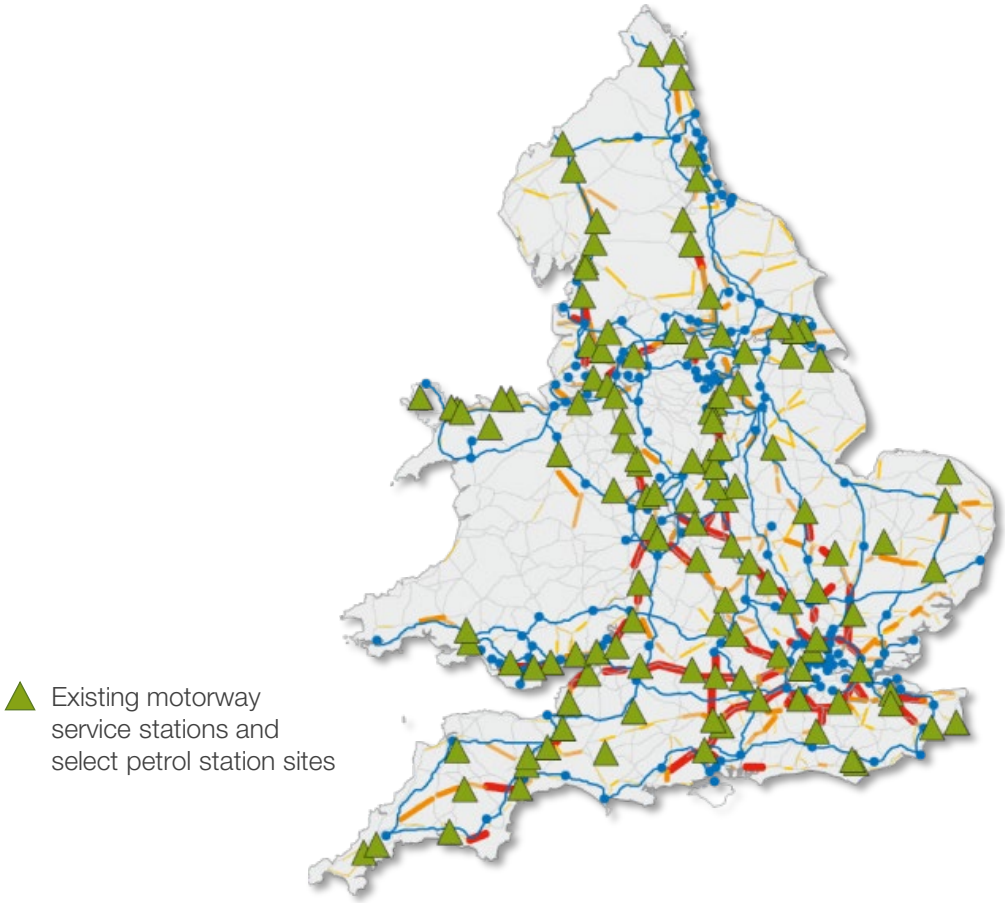
99% coverage
England and Wales

50x
faster than domestic charging

54
motorway service stations

no more than **50 miles**
to a fast charging station

Proposed fast charging UK network map



▲ Existing motorway service stations and select petrol station sites

We have a critical role to play in the wider enablement of UK transport decarbonisation beyond passenger vehicles

The role of Hydrogen in Transport

Hydrogen has a critical role to play as we transition to cleaner transport, especially in heavier modes of transport (such as HGVs).

Green hydrogen is made from electrolysis using clean renewable electricity, highlighting the need for electricity infrastructure. The process produces pure hydrogen, with no harmful by-products making it the cleanest form of hydrogen. This type is ideal for fuel cell vehicles and is already being used in trials for buses and trains in the UK.

Blue hydrogen is made from steam and natural gas – leaving hydrogen and CO2. It is sometimes described as 'low-carbon hydrogen' as **90-95%** of the carbon emissions from its production are captured. There are key opportunities for National Grid Gas Transmission to support blue hydrogen.

National Grid Gas Transmission's Project Union aims to join together industrial clusters around the country, potentially creating a 2,000km hydrogen network in Great Britain, ensuring reliable, affordable and decarbonised energy for home, business & transport.

The UK Electricity System Operator

- Our target is to be able to operate a zero-carbon electricity system in Britain by 2025
- This involves maintaining a consistent supply of renewables and being flexible to changes in demand
- If successful, we'd be the first system operator in the world to make the full transformation

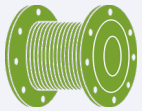
Grid reinforcement and renewable connections

- We expect demand for electricity to rise as transport becomes electrified
- To meet this demand, we are connecting renewables as quickly and efficiently as possible, investing in grid modernisation, connecting offshore wind and continuing to build interconnectors from the UK to Europe
- Wider reinforcement of the grid is also needed though local distribution network investment and across strategic investments like MSAs and clean transport hubs for heavy goods vehicles (HGVs), buses and ports

UK Government manifesto commits to

40GW
of offshore wind
by 2030

requires **1,000km**
new onshore cables



700km
to be delivered by National Grid

Interconnectors could meet

11%
of UK electricity demand
by 2030

Energy through interconnectors could be

90%
carbon free
by 2030

We are engaging with various stakeholders across the transport and digital sectors to understand their needs, concerns and asks

- Our fast charging network proposal was taken forward by OZEV who secured £950 million of funding to deliver to 110 MSAs over the next 5 years. National Grid connections will form a significant part of this work
- OZEV then published Project Rapid, a strategy even more ambitious than our original – ensuring motorists are always within 30 miles of an ultra-rapid charging station, and inclusive of not only motorways
- Project Rapid targets 6 high power, open access chargepoints at MSAs by 2023, and 6,000 total by 2035
- We will continue to work with Government around trials for HGVs as part of the Department for Transport's core delivery team to accelerate the uptake of zero carbon HGVs
- We're also continuing to work with the rail industry, an existing customer of National Grid, as further electrification in planned
- Looking further ahead, we continue to engage with all transport sectors – in particular across the maritime and aviation industries as a thought leader, developing solutions for these sectors.
- We will work with Government under the Decarbonisation of Transport Plan to enable transport to decarbonise in the most economic and efficient way

Decarbonisation of Transport in the US

Transport is the biggest source of greenhouse gas emissions in our US service territories, and a leading cause of air pollution

This won't change without our help

Our Clean Transportation Vision

By 2030, clean electricity will be the fuel that moves most people from place to place in the communities we serve

National Grid can:

- Provide the backbone to make it happen
- Create products that enable access for all customers
- Build a profitable business around this tectonic shift

Clean transportation is a key priority for National Grid and the US states we serve

Light-Duty Vehicle (LDV) and National Grid EV charger targets

LDV target 2025
850,000 (50,000 today)

NG EV charger target 2025
17,000 (1,400 today)

LDV target 2025
45,000 (5,000 today)

NG EV charger target 2025
3,000 (300 today)

LDV target 2025
300,000 (30,000 today)

NG EV charger target 2025
11,000 (1,300 today)

~$400m+
Total investment opportunity by 2025
~$200m approved to date

Our guiding principles

1. Greenhouse gas emissions reduction is critical for all of our customers. National Grid has a leadership role to play in the clean energy transition
2. Our customers and communities have equitable and affordable access to clean transportation choices
3. Design leadership is needed to facilitate smart integration of EVs. Utilities can lead with best practices
4. Profitability and growth are key to enable long-term success

Our US strategy
- three main customer segments

Public & Workplace Programmes

>$10k

upfront cost is prohibitive for most customers

Support customers to deploy publicly-available chargers and install & operate the stations more cost-effectively

Why?

Limited public charging is one of the biggest barriers to EV adoption

Residential Programmes

>80%

of charging is at home

Provide grid-optimized charging access and enable EV ownership for all residential customers

Why?

Necessary to enable EV adoption, but barriers exist for >40% of customers

Fleet Programmes

~20%

low and middle income customers don't own vehicles

Includes support for public private fleets. Provides customers with a transition plan, guidance and funding

Why?

One Medium-Heavy Duty Vehicle (MHDV) EV truck or bus can reduce 8 times more CO_2 emissions than a passenger vehicle

We are leading by example by offering EV incentives to employees and electrifying our own fleet

Our Employees

- Established in 2018, our scheme offers employees incentives for EVs, solar, battery storage, & energy management systems
- >450 employees have purchased EVs (8% of management employees - opened to union employees in FY21)
- >$2m of incentives provided for EVs
- Benefits include increased employee satisfaction, even for non-participants. ~60% of 823 surveyed employees said the programme improved their perception of the company

Our Fleet

- National Grid is the first leading utility in the US to make an EV100 commitment to electrify its fleet
- National Grid has committed to adopting a 100% zero carbon fleet by 2030 for our light-duty vehicles, while also pursuing the replacement of our medium and heavy-duty vehicles with zero carbon alternatives
- 172 charging ports have been installed at 27 National Grid locations in 2020; 22 more to be installed in 2021 at 9 more locations

National Grid has the world's first all-electric backhoe. The 9-ton machine is powered entirely by battery, providing a safer and quieter work environment, reducing air pollution, and helping National Grid move toward its Net Zero by 2050 goal.

Our strategy has driven solid progress across each of our states…

	Massachusetts	New York	Rhode Island
Programme updates	• **>1,300** ports installed • **500** customers participating in SmartCharge* programme • **10** Fleet assessments completed, 6 underway, **>2,000** vehicles evaluated	• Phase 1: **>1,300** ports installed • Phase 2: **68** ports installed	• **~300** ports installed • **~300** participants in SmartCharge* programme • **9** Fleet assessments completed, 2 underway, **3,000** vehicles evaluated
Regulatory updates	• Phase 3 programme filed July 14th 2021 • Includes over **$250m** of EV programmes	• NIMO rate case settlement expected summer 2021 • Residential Managed Charging Proposal filed	• Process underway for Rate Year 4 continuation of programmes
Statewide EV registrations / 2025 goal	• **~38,000 / 300,000**	• **~70,000 / 850,000**	• **~3,200 / 43,000**

As of June 2021, National Grid has installed ~3,000 charging ports across our jurisdictions with 50% located within environmental justice and disadvantaged communities.

* SmartCharge programmes provide off-peak charging incentives to residential customers in Massachusetts and Rhode Island

For more information on our 'Grid Guide to' series,
visit our website page
www.nationalgrid.com/investors/events/grid-guide