

Institute for Public Policy Research



# PLUGGED IN

ACCELERATING THE  
ELECTRIFICATION OF  
ROAD TRANSPORT

**Joshua Emden**

August 2024

## ABOUT THE AUTHOR

Joshua Emden is a senior research fellow at IPPR.

---

### Download

This document is available to download as a free PDF and in other formats at:

<http://www.ippr.org/articles/plugged-in>

### Citation

If you are using this document in your own writing, our preferred citation is:

Emden J (2024) *Plugged in: Accelerating the electrification of road transport*, IPPR. <http://www.ippr.org/articles/plugged-in>

### Permission to share

This document is published under a creative commons licence:

Attribution-NonCommercial-NoDerivs 2.0 UK

<http://creativecommons.org/licenses/by-nc-nd/2.0/uk/>

For commercial use, please contact [info@ippr.org](mailto:info@ippr.org)



# SUMMARY

The new government has been elected with a mandate to deliver ambitious climate action. Their manifesto committed Labour to reinstating the 2030 ban on the sale of new internal combustion engine cars (forwards from the last government's rollback to 2035). The Climate Change Committee's most recent assessment criticised the rollback of the phase-out date and the message this sent about the UK's level of commitment to net zero.

In this briefing, we highlight the substantial benefits to the cost of living and to energy security that come from accelerating the electrification of transport, alongside an increased focus on modal shift. In particular, we highlight how running costs for electric vehicles are much cheaper than petrol or diesel equivalents and demonstrate how rapid electrification of surface transport can drastically improve the UK's energy security position.

Lastly, to understand how we achieve these benefits, we detail exactly how various vehicle types and infrastructure requirements are starting to fall behind the pace required, accompanied by policy recommendations to correct course.

# THE BENEFITS OF ACCELERATING TRANSPORT DECARBONISATION

There are clear economic and social benefits to rapidly accelerating the electrification of almost all forms of surface transport. At a macro-economic level, the Department for Transport’s own analysis suggests net economic benefits of £67 billion for a rollout aligned with the Climate Change Committee’s preferred pathway, which sees battery electric vehicles (BEVs) account for 95 per cent of car and van sales by 2030. This compares favourably to the £44 billion aligned with the previous government’s ‘preferred option’ for BEVs to account for only 80 per cent of car sales and 70 per cent of van sales by the same date (DfT 2023).

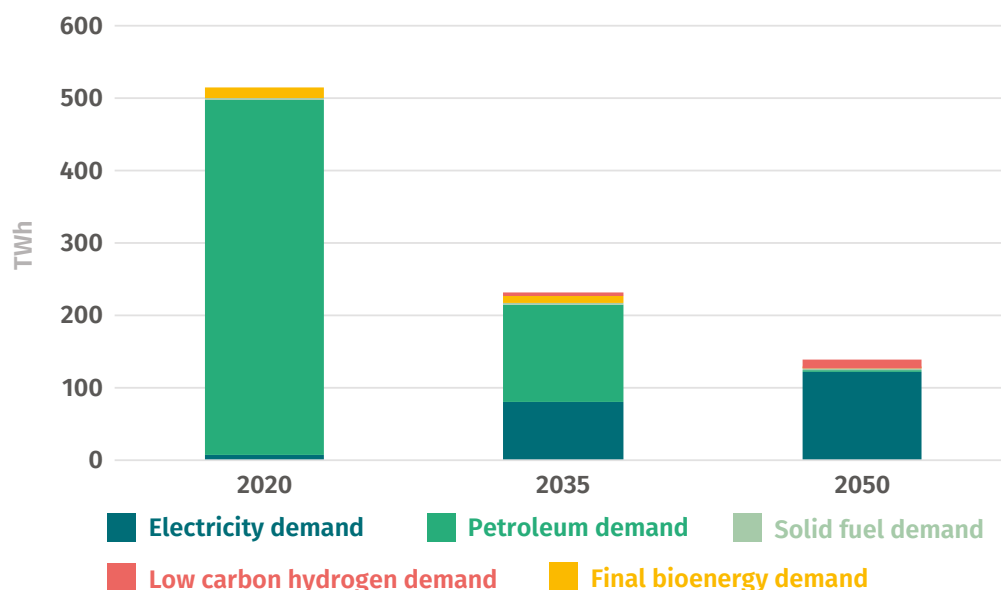
More pertinent to the public’s pockets, choosing electric can also substantially reduce household costs. BEVs are already, and will continue to be, much cheaper to charge and maintain than petrol and diesel car equivalents. With home charging points that recharge car batteries overnight, the saving can equate to up to £600 per year (Downes 2022). In addition, the total cost of ownership of a second or third-hand EV is over 30 per cent cheaper compared to a petrol car, because EVs are more durable and easier to maintain (Kumar 2019). These benefits also highlight how important it is that low-income households are not priced out of savings due to the upfront costs of an EV, and that a second-hand EV market expands more quickly (Frost et al 2021).

Pursuing the rapid and near full electrification of almost all surface transport also has major benefits for energy security. Alongside residential buildings, surface transport was the most energy intensive sector in the UK economy in 2020, accounting for just under a quarter (23.5 per cent) of total energy demand (CCC 2021). However, as figure 1 shows, shifting to an electrified transport system will reduce energy demand for surface transport by 55 per cent by 2035 and 74 per cent by 2050.

**FIGURE 1**

**Fully decarbonising surface transport will significantly decrease energy demand and improve energy security in the UK**

*Total surface transport energy demand across three milestone years*



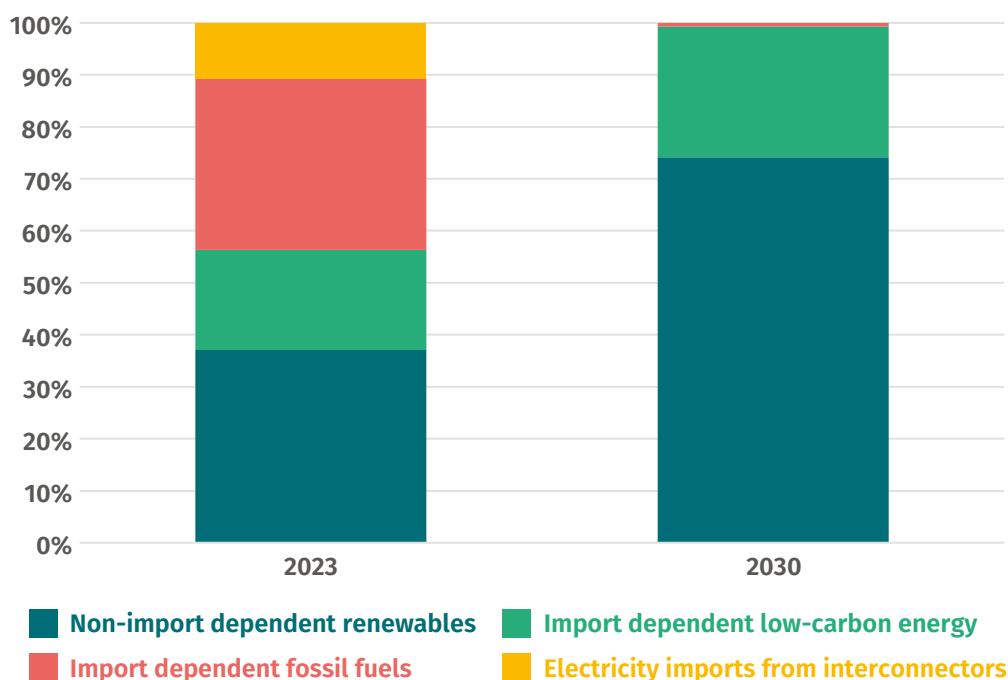
Source: CCC 2021, replicated by IPPR

The electrification of transport and rapid deployment of renewable generation not only means we use less energy overall, but we will also import less of the energy that we do use. In 2023, the UK generated over half of its electricity (55 per cent) from all low-carbon sources (ie including nuclear and biomass) but over a third of its electricity (37 per cent) from renewable generation requiring no fuel imports (ie wind, solar, hydropower and storage) (National Grid ESO 2024a). As figure 2 shows, under Labour’s plan to fully decarbonise the grid by 2030, renewable generation requiring no fuel imports would account for 75 per cent of all electricity produced, with 15 per cent of the remainder coming from nuclear power, the supply chains for which are generally more secure.

**FIGURE 2**

**By 2030, the UK could be producing three-quarters of its electricity from renewable generation that does not depend on any fuel imports**

*Electricity generation mix according to dependency on fuel imports*



Source: National Grid ESO 2024a; MacDonald et al 2022, adapted by IPPR

The combined effect of reducing energy demand in surface transport and supplying the vast majority of that demand from homegrown renewable energy will dramatically decrease the need for fossil fuel imports and make the UK much more energy secure. On the global stage, by pursuing this pathway, the UK would also be recommitting to climate leadership by following recommendations from the International Energy Agency to rapidly decrease global oil consumption, as well as being better placed to spearhead diplomatic efforts to economically isolate Russia (Frost 2023).

## CONSIDERING THE FUTURE TRANSPORT NETWORK

While rapidly accelerating the electrification of transport is critical to delivering economic and social benefits to the UK, it is important to recognise that the road transport network, and consequently transport policy, should be about more than just cars.

The current approach to decarbonising road transport largely envisages simply swapping all petrol and diesel cars for BEVs and still allows for an overall growth in car demand. However, such an approach will create more congestion and increase the overall cost of the transition. Previous IPPR analysis has identified how the CCC's preferred approach to decarbonisation could lead to an 11 per cent increase in traffic and an additional 9.6 million extra vehicles between 2021 and 2050 (Frost et al 2021). Cost benefit analysis by the Department of Transport further suggests by far the biggest cost of transitioning to EVs is congestion (anywhere between £52bn to £105bn) (DfT 2023; Frost et al 2021). We also know that increases in traffic are also likely to disproportionately impact low-income households, creating more air and noise pollution and congestion in these neighbourhoods.

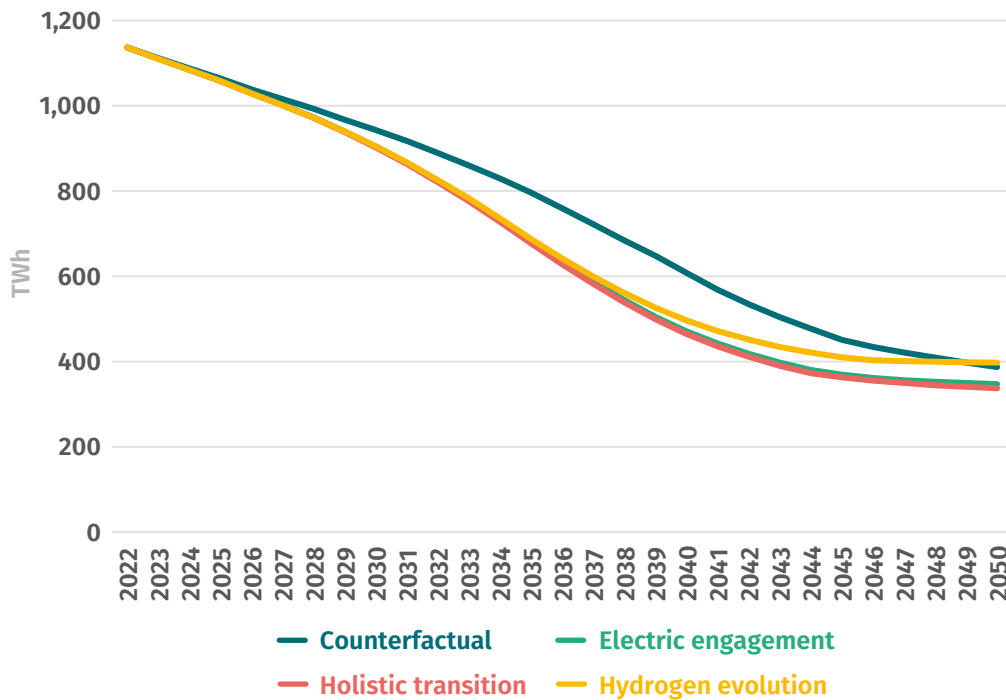
By contrast, modal shift can decrease traffic, improve transport access and create safer streets. For example, re-allocating road space for cycling infrastructure can lead to a well-evidenced effect known as 'traffic evaporation'. In this phenomenon, new cycle lanes cause a short-term increase in traffic but gradually traffic levels either fall to previous levels or reduce even further than they were before as people decide to switch to alternative forms of transport (Hidalgo 2021; The Guardian 2022). From an economic perspective, active travel also has a benefit to cost ratio of 4.3 (NAO 2023) compared to between 1.35 and 1.44 for a low-carbon future with increased car demand (DfT 2023).

A future with fewer cars on the road is not a radical commitment. For example, one of the core scenarios in the latest National Grid Future Energy Scenarios report plans for four million fewer cars in Great Britain by 2050 (the 'holistic transformation' scenario). Importantly, as figure 3 shows, this scenario is also the least energy intensive, with total energy demand around 15 per cent lower than their most energy intensive scenario, which also sees the highest number of cars and greatest use of hydrogen in road transport. In other words, a transport system with more emphasis on public transport and active travel is even better for UK energy security (National Grid ESO 2024b).

**FIGURE 3**

**Meeting the UK's net zero targets for road transport with four million fewer vehicles on the road is also likely to be the least energy-intensive decarbonisation pathway**

*Comparison of total energy demand over time between different decarbonisation pathways*



Source: National Grid ESO 2024b, adapted by IPPR

However, we are currently going in the wrong direction. According to the government estimates, distance travelled by car is now on an upward trajectory, increasing by 2.2 per cent in 2023 compared to the previous year (DfT 2024). By contrast, traffic miles by buses, coaches and bicycles are down. Bus and coach traffic decreased by 1.7 per cent from 2022 levels, while pedal cycle traffic was 7.3 per cent below 2022 levels (DfT 2024).

### POLICY RECOMMENDATIONS

To unlock the potential of active travel, and deliver meaningful change in active travel provision for communities across the country, IPPR has recently called for the UK government to provide a 10-year guarantee for active travel investment from 2025 to 2035; new green investment of at least £225 million per year; some reallocation of roads investment; more single-pot, long-term funding; and a 10-year investment plan for the National Cycle Network (Singer Hobbs and Frost 2024).

## BATTERY ELECTRIC VEHICLES: CARS AND VANS

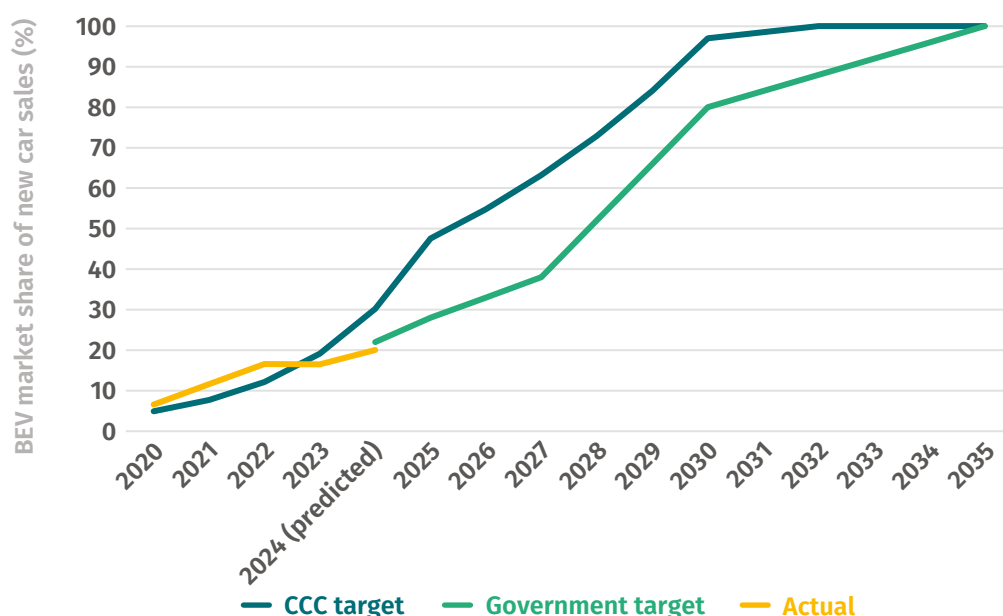
While we are calling for a planned reduction in vehicle use and ownership, it is of course clear that there will always be a need for private and shared access to cars and vans. Recent IPPR research highlights that there are people who are currently car-reliant for whom shifting to electric vehicles is going to be crucial to reducing their emissions (Frost and Singer Hobbs 2024). It is therefore concerning that BEV sales are not keeping pace with what is needed to meet net zero targets. After relatively strong growth between 2020–22, the BEV market share of new car sales has plateaued at around 16 per cent since 2022 (Edwards 2024a; SMMT 2024). Whilst sales are predicted by the The Society of Motor Manufacturers and Traders (SMMT) to rebound and account for one in five vehicles (20 per cent) by the end of 2024, this will be insufficient to meet the CCC’s target of 30 per cent market share by 2024. As figure 4 shows, BEV sales are predicted to fall below this target, and are even likely to miss the government’s sales quota of 22 per cent. This 22 per cent target is necessary to phase-out petrol and diesel cars by 2035, five years later than the date recommended by the CCC.

In addition, in its most recent Carbon Budget Delivery Plan, the government found that emissions from plug-in hybrid electric vehicles are three to five times higher than the government has assumed in its modelling (CCC 2023). 2023 was the first time when surface transport emissions decreased while distance travelled increased. However, as the CCC notes, the rate of emissions reductions will need to substantially increase over the next seven years (CCC 2024). As the CCC recommends, it is therefore critical to ensure that the pace of BEV rollout increases and plug-in hybrids are also phased out by 2030.

**FIGURE 4**

**After strong growth between 2020–2022, BEV sales are now falling behind both government and CCC targets**

*Battery electric vehicle (BEV) market share of new car sales over time comparing actual rollout to government and CCC targets*



Sources: Edwards 2024a; CCC 2023; SMMT 2024, adapted by IPPR



Vans have made even less progress. BEV vans should have accounted for 21 per cent of all van sales in 2023 under the CCC target, but in reality only had a 5.9 per cent market share of sales (Edwards 2024a; CCC 2023). In future, it is likely that incentives for BEV van purchasing and manufacturing will need to increase if sales are to get on track.

### **POLICY RECOMMENDATIONS**

In order to accelerate the sale of electric vehicles, we encourage the new Labour government to proceed with its manifesto commitment to reinstate the ban on the sale of fossil fuel cars by 2030. In addition, we recommend a ban on the purchase of carbon emitting cars for public sector and commercial car fleets. It is also critical to accelerate people's access to electric vehicles through car clubs, social leasing and Motability schemes. In addition, further financial incentives will also need to increase to encourage BEV van purchasing and manufacturing.

## **BATTERY ELECTRIC VEHICLES: BUSES AND HGVS**

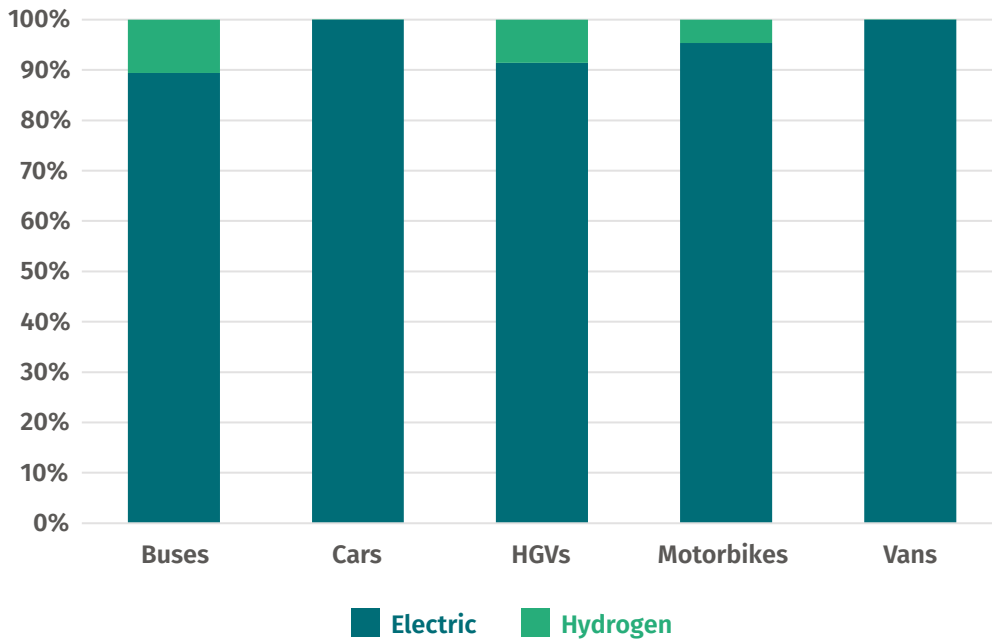
At first glance, the government is making better progress on decarbonising buses and HGVs. While the government has not yet committed to a phase-out of diesel buses, its Zero-Emission Bus Regional Area (ZEBRA) scheme has successfully promoted electric buses in line with targets. On HGVs, the CCC notes that regulatory mechanisms still need to be developed but that the government has at least published a clear strategy and launched innovation funding.

However, particularly for buses, IPPR research shows how electric bus deployment needs to ramp up. At current pace, we will not have a zero-emission fleet until 2060. Government estimates that over 3,400 zero emission buses having been ordered or funded as of May 2023; however, most buses in use are in London. Outside the capital, local delivery is more varied, with many regions often missing out on the limited pots of funding available through the ZEBRA scheme (Frost et al 2023).

Buses and HGVs are two of three vehicle types, alongside motorbikes, where hydrogen may play a very small role, as figure 5 shows below – drawing from the National Grid's Future Scenario. However, it is important that government does not overstate hydrogen's use. Electric buses and electric HGVs are, and should be, the default technology choice. An over-emphasis on hydrogen's role comes with significant uncertainty over how it will be supplied. In addition, it is not genuinely low carbon; it will likely increase gas imports in the short and medium-term; and it will require much higher infrastructure costs to set up distribution and refuelling networks (Frost et al 2023).

**FIGURE 5**

**The vast majority of road vehicles in 2050 are likely to use electric batteries**  
*Powertrain by transport type by 2050*



Source: National Grid ESO 2024b, adapted by IPPR

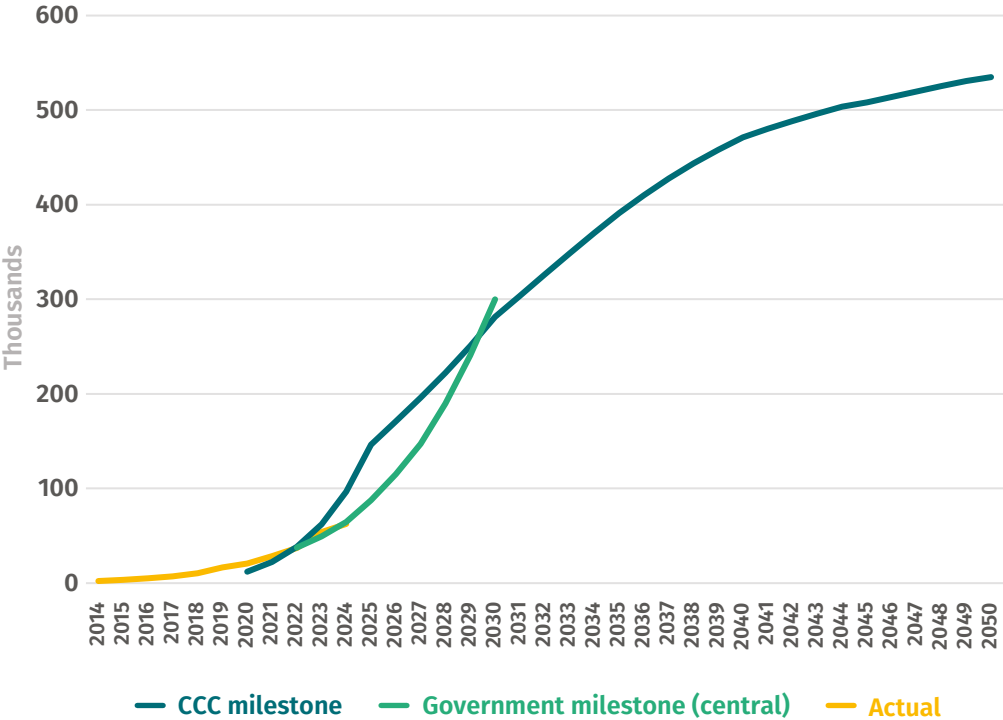
## **POLICY RECOMMENDATIONS**

To deliver a world-leading local public transport system, IPPR has previously recommended a series of policies to accelerate the rollout of electric buses (Frost et al 2023). These include setting a phase-out date of new diesel bus sales to 2030 and making clear the default technology choice for all new buses is electric; supporting mayoral authorities to pursue franchise models for their bus networks; supporting every local authority to reallocate road spaces to buses active travel; to extend ZEBRA funding by £2.5 billion between now and 2030; and end the competitive short-term funding model for transport and move to strategic, long-term, single-pot funding.

# CHARGING INFRASTRUCTURE

The government’s target to deploy at least 300,000 public chargers by 2030 is broadly in line with the CCC’s central scenario, albeit based on a trajectory that requires a steeper rate of acceleration in deployment in the mid-2020s (CCC 2023). Based on year-to-date figures, actual deployment of charging infrastructure is broadly in line with the government pathway, as figure 6 shows.

**FIGURE 6**  
**Deployment of electric chargers is broadly on track to meet the government’s target of 300,000 chargers by 2030 but will require a gradual increase in the rate of deployment in future years**  
*Cumulative charging devices by year, comparing real world deployment to targets*



Sources: CCC 2023, Edwards 2024b

However, as with bus numbers, the current distribution of charging infrastructure is skewed heavily towards London. With a target of 300,000 chargers, the government has an implied target of 430 chargers per 100,000 people, but, as figure 7 shows, only London is currently even halfway towards this target.

**FIGURE 7**

**The distribution of charging devices by region is unequal**

*Charging devices per 100,000 people by region as of 31 July 2024*



Sources: Edwards 2024b; ONS 2024, adapted by IPPR

**POLICY RECOMMENDATIONS**

All governments of the UK must set out plans for a comprehensive public charging network, alongside the investment to deliver it. These local and national plans should not be created in isolation from an overall goal to reduce car dependency and increase walking, cycling and the use of public transport.

## CONCLUSION

In summary, accelerating the electrification of transport brings substantial benefits to the cost of living and to energy security. Upcoming IPPR research will focus on the job creation potential of green transport. 'Move fast and fix things' is the motto of the new secretary of state for transport, and there's a lot to be gained for upping the pace on electrification.

## REFERENCES

- Climate Change Committee [CCC] (2020) 'Sixth Carbon Budget', CCC. <https://www.theccc.org.uk/publication/sixth-carbon-budget/>
- Climate Change Committee [CCC] (2023) *Progress in reducing emissions: 2023 Report to Parliament*, CCC. <https://www.theccc.org.uk/wp-content/uploads/2023/06/Progress-in-reducing-UK-emissions-2023-Report-to-Parliament-1.pdf>
- Climate Change Committee [CCC] (2024) *2024 Progress report to Parliament*, CCC. <https://www.theccc.org.uk/publication/progress-in-reducing-emissions-2024-report-to-parliament/#:~:text=and%20Suzie%20Wright.,Executive%20summary,successive%20governments%20to%20achieve%20it>
- Department for Transport [DfT] (2023) *Zero Emissions Vehicle Mandate and non-ZEV Efficiency Requirements Consultation-stage Cost Benefit Analysis*. <https://assets.publishing.service.gov.uk/media/64537b34c33b4600cf5e631/zev-mandate-cost-benefit-analysis.pdf>
- Department for Transport [DfT] (2024) 'Road traffic estimates in Great Britain, 2023: Traffic in Great Britain by vehicle type', dataset. <https://www.gov.uk/government/statistics/road-traffic-estimates-in-great-britain-2023/road-traffic-estimates-in-great-britain-2023-traffic-in-great-britain-by-vehicle-type#pedal-cycle-traffic>
- Downes S (2022) 'Cost of living crisis: EVs are now nearly £600 cheaper a year to run than petrol alternatives', news article, inews. <https://inews.co.uk/inews-lifestyle/money/motoring/cost-of-living-crisis-evs-are-now-nearly-600-cheaper-a-year-to-run-than-petrol-alternatives-1592417>
- Edwards J (2024a) 'EV market stats 2024', blog, Zapmap. <https://www.zap-map.com/ev-stats/ev-market>
- Edwards J (2024b) 'EV charging statistics 2024', blog, Zapmap. <https://www.zap-map.com/ev-stats/how-many-charging-points>
- Frost S (2023) LinkedIn post, LinkedIn. [https://www.linkedin.com/posts/stephenfr0st\\_transport-demandreduction-energysecurity-activity-7142053311947436032-cVpw/?utm\\_source=share&utm\\_medium=member\\_desktop](https://www.linkedin.com/posts/stephenfr0st_transport-demandreduction-energysecurity-activity-7142053311947436032-cVpw/?utm_source=share&utm_medium=member_desktop)
- Frost S, Massey-Chase B and Murphy L (2021) *All aboard: a plan for fairly decarbonising how people travel*, IPPR. <https://www.ippr.org/articles/all-aboard>
- Frost S, Emden J, Murphy L and Rankin L (2023) *A smooth ride: electric buses and the route to a fairer transport system*, IPPR. <https://www.ippr.org/articles/a-smooth-ride>
- Frost S and Singer Hobbs M (2024) *Moving together: a people-focussed pathway to fairer and greener transport*, IPPR. <https://www.ippr.org/articles/moving-together>
- The Guardian (2022) 'Why bike lanes don't make traffic worse: It's complicated', YouTube. [https://www.youtube.com/watch?v=UabSO0X1rYw&ab\\_channel=TheGuardian](https://www.youtube.com/watch?v=UabSO0X1rYw&ab_channel=TheGuardian)
- Hidalgo D (2021) 'Traffic evaporation: what really happens when road space is reallocated from cars?', blog, The City Fix. <https://thecityfix.com/blog/traffic-evaporation-what-really-happens-when-road-space-is-reallocated-from-cars/>
- Kumar C (2019) *Going electric: how everyone can benefit sooner*, Green Alliance. [https://green-alliance.org.uk/wp-content/uploads/2021/11/going\\_electric\\_how\\_everyone\\_can\\_benefit\\_sooner.pdf](https://green-alliance.org.uk/wp-content/uploads/2021/11/going_electric_how_everyone_can_benefit_sooner.pdf)
- MacDonald P, Czyżak P, Fox H (2022) *A path out of the gas crisis*, Ember. <https://ember-climate.org/insights/research/uk-gas-power-phase-out>
- National Audit Office [NAO] (2023) *Active travel in England*, NAO. <https://www.nao.org.uk/wp-content/uploads/2023/06/active-travel-in-england-summary.pdf>
- National Grid Energy Systems Operator [National Grid ESO] (2024a) 'Britain's Electricity Explained: 2023 Review', news article, National Grid ESO. <https://www.nationalgrideso.com/news/britains-electricity-explained-2023-review>
- National Grid Energy Systems Operator [National Grid ESO] (2024b) 'Future energy scenarios (FES)', webpage, National Grid ESO. <https://www.nationalgrideso.com/future-energy/future-energy-scenarios-fes>

Office for National Statistics [ONS] (2024) 'Population estimates for England and Wales: mid-2023', dataset. <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/populationestimatesforenglandandwales/mid2023>

Singer Hobbs M and Frost S (2024) *Stride and ride: England's path from laggard to leader in walking, wheeling and cycling*, IPPR Fair Transition Unit. <https://www.ippr.org/articles/stride-and-ride>

The Society of Motor Manufacturers and Traders [SMMT] (2024) 'UK reaches million EV milestone as new car market grows', news article. <https://www.smmt.co.uk/2024/02/uk-reaches-million-ev-milestone-as-new-car-market-grows>

## ABOUT IPPR

IPPR, the Institute for Public Policy Research, is an independent charity working towards a fairer, greener, and more prosperous society. We are researchers, communicators, and policy experts creating tangible progressive change, and turning bold ideas into common sense realities. Working across the UK, IPPR, IPPR North, and IPPR Scotland are deeply connected to the people of our nations and regions, and the issues our communities face.

We have helped shape national conversations and progressive policy change for more than 30 years. From making the early case for the minimum wage and tackling regional inequality, to proposing a windfall tax on energy companies, IPPR's research and policy work has put forward practical solutions for the crises facing society.

IPPR  
4th floor,  
8 Storey's Gate  
London  
SW1P 3AY

E: [info@ippr.org](mailto:info@ippr.org)  
[www.ippr.org](http://www.ippr.org)  
Registered charity no: 800065 (England and Wales),  
SC046557 (Scotland)  
This paper was first published in August 2024. © IPPR 2024

The contents and opinions expressed in this paper are those of the authors only.

The progressive policy think tank

