

Development of Electric Vehicles in Northern Ireland



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Executive Summary

Overview

The sales of plug-in Hybrid (PHEV) and Battery electric vehicles (BEV) in the UK have seen an unprecedented growth over the last year, with more than one in ten new vehicles registered as a PHEV or BEV. In the first quarter of 2021 about 90,000 PHEVs and BEVs were registered in the UK up 50% on last year¹.

This uptake has been driven by improvements in vehicle availability and model selection and improvements in battery range alongside incentive schemes for buyers and an increase in charging infrastructure provision.

Although Northern Ireland's car drivers have the same incentives on offer as the rest of the UK, EV uptake, while growing, lags behind with only 4,818 vehicles registered as EVs (0.4% of total registered vehicles) as of December 2020.

With the now confirmed announcement by the UK government to ban the sale of all new petrol and diesel cars by 2030 and all PHEVs by 2035, Northern Ireland requires a strategy that would ensure a faster transition than that which it is currently on in order to also meet its overarching Net Zero target of 100% reduction in all greenhouse gas emissions by 2050 (compared to 1990 levels).

While there are grants and incentives available through UK-wide initiatives, lower EV awareness and user uptake means there is a role for the Northern Ireland Executive government to play through devolved policy and actions that further encourage the uptake of EVs, to ensure they meet the emission reduction targets.

Summary of global good practice review

Based on the literature review, we found that whilst purchase incentives drive EV uptake, an even more powerful approach is to use taxation to penalise ICE vehicles whilst rewarding EVs, to lower the purchase price gap between ICE vehicles and EVs. France has taken this approach through a "Bonus Malus" scheme, and Norway and the Netherlands have successfully achieved strong EV uptake with the approach of minimising the price gap.

Furthermore, the availability of a reliable public charging network improves consumer confidence in EVs and is also beneficial in increasing EV awareness. The more public charging stations there are, the greater visibility vehicle owners have on the EV charging process, increasing their confidence in the charging process. Most countries have developed short term targets for the roll-out of public charging infrastructure while other countries have set specific targets or on fast charging infrastructure on the major highway network (e.g. France, Netherlands).

Public-private partnerships are essential for EV charging infrastructure market development, with almost all countries using this approach. Whilst it is acknowledged that in the early stages of development, the EV charging infrastructure market is rarely profitable, it is essential for the private sector to have public sector support to build the networks, which will facilitate growth of the market and hopefully a move to profitability in the future. This does not necessarily have to be in the form of state government financial support, in the case of the

¹ <https://www.smm.co.uk/vehicle-data/>

Netherlands city municipalities have been working together in regional concessions for public charging infrastructure, requiring little additional government investment.

Finally, the literature review has highlighted that there is not one solution to encouraging growth of the EV market. Progressive government targets, both monetary and non-monetary incentives, sufficient funding programmes and a comprehensive charging infrastructure network along with a definitive approach to charging infrastructure development have all contributed to successful EV market development in leading countries such as Norway and the Netherlands.

Key challenges and opportunities

From the review we have established five broad themes that require government interventions to help develop the EV market in Northern Ireland, which included the following:

- Market development
- Utilisation
- Awareness
- Cost of vehicle ownership
- Access to EV charging

The table below summarises the key challenges and opportunities for EV development in Northern Ireland.

Table 0-1: Summary of challenges and opportunities

Theme	Challenges	Opportunities
Market development	<ul style="list-style-type: none"> • Commercial viability of developing EV public charging network • Lack of funding/ limited access and inclusion into UK Charging infrastructure government funding • Limited experience and resource at local authority level to deliver EV projects 	<ul style="list-style-type: none"> • Availability of wider EV models – with better range and affordable prices • Larger commitment from vehicle manufacturers on improving battery technology
Utilisation	<ul style="list-style-type: none"> • Reliability of public charging • Upgrade of existing network • Grid capacity and connection costs 	<ul style="list-style-type: none"> • EV Charging technology improvements – super chargers, wireless charging, etc.
Awareness	<ul style="list-style-type: none"> • Lack of public knowledge about EV running costs (as compared to ICE vehicles) • Anxiety about using an EV 	<ul style="list-style-type: none"> • Increasing consumer confidence in EVs
Cost of vehicle ownership	<ul style="list-style-type: none"> • Higher initial purchase costs compared to ICE vehicles • Socio-economic factors 	<ul style="list-style-type: none"> • Declining EV costs, with advances in battery technology
Access to EV charging	<ul style="list-style-type: none"> • Lack of access to driveway for home charging, e.g., 60% of households have no access to driveway in Belfast • Lack of access to charging on public car parks/ workplace charging • Need to develop a network of fast charging in highways to facilitate long distance/ cross-border travel 	<ul style="list-style-type: none"> • Majority of population living in rural areas with access to home charging • Potential for private operators to set up rapid charge points/ EV charging hubs.

EV forecasts

Prior to developing the potential measures, we have forecasted EV numbers for three potential EV scenarios and the corresponding public EV charge point requirements. These forecasts provide a guide to DfI on what levels of EV uptake can be achieved, and the corresponding local policies and interventions that need to be introduced to achieve these targets.

We forecast there will be between 60,000 and 125,000 EVs in Northern Ireland in 2025, compared to 4,818 in 2020. This will increase to 400,000 EVs by 2035 in the most conservative scenario (Modest Growth), 600,000 in the medium scenario (Addressing Climate Change) and 750,000 EVs in the High scenario (Accelerated Ambition).

We have considered a more bullish market outlook for all three scenarios until 2040, given the ongoing improvements in battery technology costs, wider availability of electric car models, uptake of EVs by fleet operators and enthusiasm of EV buyers witnessed in 2020. In addition, we believe the point of inflection, i.e., a paradigm shift towards EV has to happen before 2030 when sales of all new pure petrol and diesel vehicles will end.

Given the rural nature of the country and the high ratio of consumers who potentially have access to home charging solution, Northern Ireland's infrastructure development should focus on developing the rapid charging network which will help EV user's top-up their vehicles when required such as during long distance trips, and the urban areas where access to a home charging solution is not readily available.

In consideration of the charge points to EV ratio of 1:70, Northern Ireland would require roughly 1,415 public charge points in its network in 2025 (Addressing Climate Change scenario) to meet the potential demand from EVs compared to 337 charge points currently available of which, about two-thirds should be rapid charge points.

Overview of short to medium term measures

In order to deliver a consistent and sustainable EV development plan, we recommend Northern Ireland (DfI) to set up a Zero Emission Vehicle (ZEV) Taskforce to develop, implement, review, and monitor measures to accelerate the uptake of zero carbon technologies in the road transport sector.

The ZEV taskforce will be an interdepartmental body chaired by Department for Infrastructure with representatives from across the public sector, ZEV manufacturers, infrastructure companies, user representative groups and other stakeholders.

The four main responsibilities of the ZEV taskforce will include:

- Improving visibility and public awareness of ZEVs
- Reviewing existing monetary and non-monetary incentives and introducing additional incentives to stimulate user uptake
- Facilitating infrastructure and market development
- Developing policies and regulations, including planning legislations, building regulations that will widely support ZEV deployment.

Table 0-2 below summarises the key measures and interventions that we would suggest for deployment in the short to medium term by the newly set up ZEV taskforce which address the four key responsibility areas identified above.

Table 0-2: Summary of measures

Area	Recommended measures
1. Visibility and public awareness of ZEVs	<ul style="list-style-type: none"> • A national public awareness campaign to raise the profile and understanding of EVs • A public driver experience roadshow to provide people across the country with the opportunity to drive an EV and better understand their benefits • Public sector and commercial fleet trials allowing public bodies and businesses to trial EVs (both cars and small vans) • Potential support for car sharing schemes providing the opportunity for non-EV owners to use EVs on short trips.
2. Monetary and non-monetary incentive	<ul style="list-style-type: none"> • Monetary measures <ul style="list-style-type: none"> – Advocate for UK tax breaks, such as Benefit-in-kind, motor tax relief, or VAT refund – Additional purchase grants and/or home charging grants, workplace charging grants (e.g., Scotland) • Non-monetary measures <ul style="list-style-type: none"> – A parking incentive including discounted or free parking for EVs (in urban areas) – EV access to bus lanes or other shared vehicle lanes to avoid traffic (in urban areas)
3. Infrastructure and market development	<ul style="list-style-type: none"> • Greater provision of charging (on-street and destination) in urban areas where access to a driveway (60% of households in Belfast do not have access to a driveway) is limited therefore a home charger incentive would be limited in take up • Establish a network of rapid charging across NI strategic highways and corridors, connecting the major urban areas • Ensure the network links into NI from Ireland are connected with a consistent service when crossing the border. With consideration to how Light Commercial Vehicle freight might be provided for • Address the issues with the current network deployed within NI.
4. Policy interventions and regulations	<ul style="list-style-type: none"> • Establish standards to procure EVs for public vehicle fleet, though share of public fleet in total vehicle fleet is low and will have negligible impact on meeting environmental goals, this will help NI set an example that it is committed to transitioning to EVs and will also act as an ambassador tool to promote EVs amongst citizens. • Introduce changes to building regulations and planning requirements where EV charging provision could be mandated in new developments and/or buildings under major renovation. For e.g., mandate installation of at least 1 EV charge point for every 10 parking spaces.

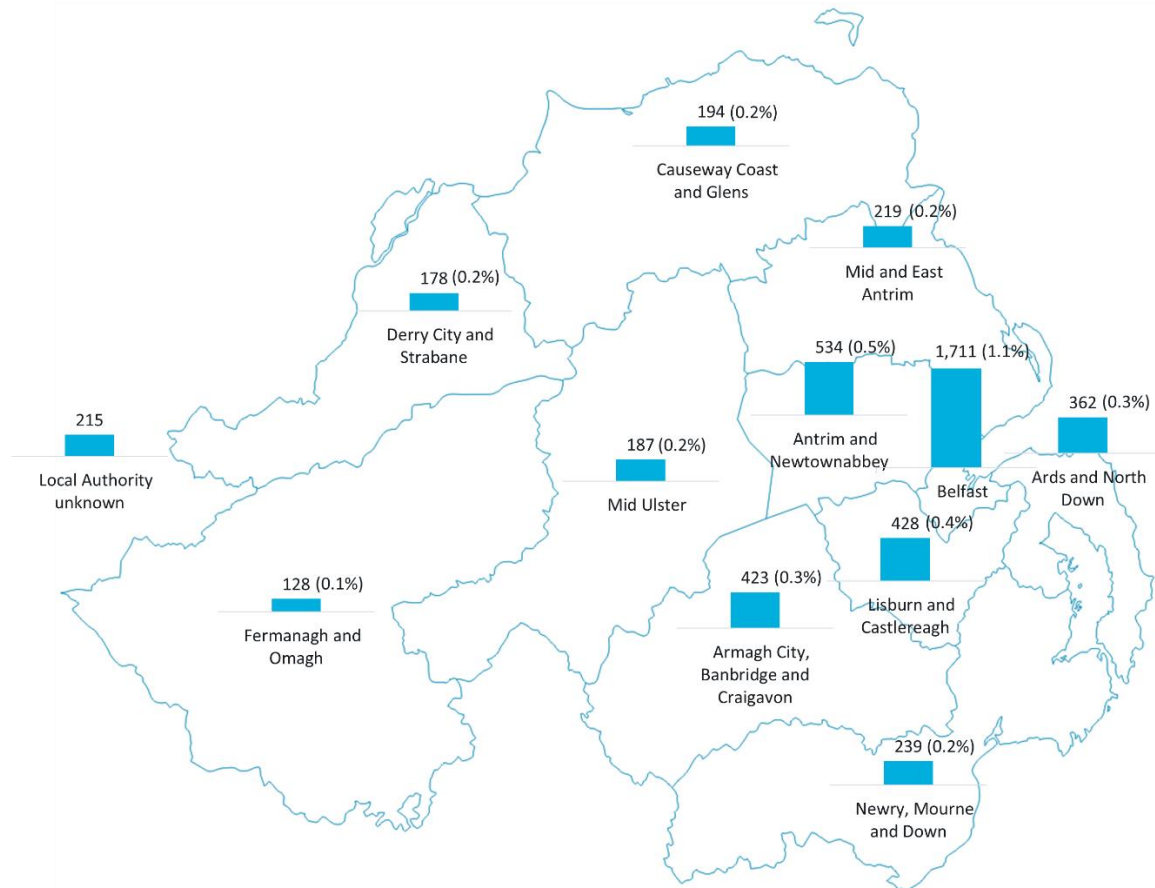
In summary, major challenges currently faced by EV users such as range anxiety, or higher cost of vehicles will increasingly be mitigated as the EV market evolves, especially with regard to advances in technology and cost efficiency in the long term. Therefore, we recommend targeted public awareness programs, alongside creating a conducive environment of policies and standards for EV infrastructure deployment will be key to drive the Northern Irish EV market in next three to five years.

1 Introduction

Overview

- 1.1 There are over 1.2 million registered vehicles in Northern Ireland as of December 2020, 82% of those vehicles are cars. In comparison, only 4,818 of them currently have an electric powertrain or are EVs (including Plug-in Hybrid Electric Vehicles or PHEVs and Battery Electric Vehicles or BEVs, collectively referred to as Ultra-Low Emission Vehicles or ULEVs) and account for less than 0.4% of total registered vehicles. The uptake is much lower than UK average, where ULEVs account for about 1% of total registered vehicles².

Figure 1-1: Total Registered EVs (% share in Registered Vehicles), Northern Ireland (2020)



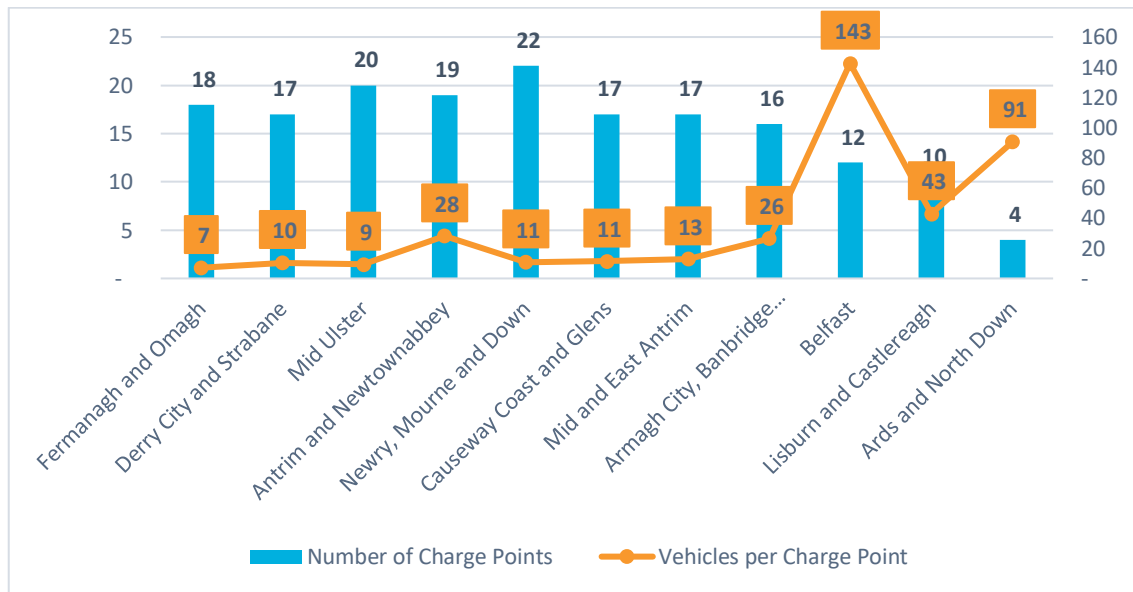
Source: Steer presentation of DfT Vehicle Statistics

² [DfI Driver, Vehicle, Operator, and Enforcement Statistics \(infrastructure-ni.gov.uk\)](https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01#licensed-vehicles); DfT vehicle statistics <https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01#licensed-vehicles>

1.2 EV Charging provision is one of the main factors that drives EV uptake. There are approximately 337 public charge points across Northern Ireland, which includes 320 fast (22kW) double headed charge points and 17 rapid charge points³. These charge points are owned and maintained by the Electricity Supply Board (ESB). This network and the charge point network in the Republic of Ireland are both accessible by a single access card. There are also a number of charge points at buildings in the public sector estate which are individually owned and managed by Councils, Health Trusts, Government Departments and NIEA. Most of the public charge points on the ecarNI network in Northern Ireland can only be accessed by using the ecarNI access card, and which is also suitable for use on the wider ecar network in the Republic of Ireland.

1.3 In Figure 1-2 we show the current ratio of chargepoint to ULEVS in each of the main local authority districts. At present the average number of ULEV's to charging points is 14 vehicles for every 1 charging station (1:14 ratio). In isolation the ratio looks good but given that the number of cars that are considered ULEV remains low at 4.7% of a circa nine hundred thousand Northern Ireland vehicle park, this ratio gives an unreliable measure of success in the early days of EV uptake. The ratio gives a more reliable understanding of EV charging infrastructure development in the longer term, when EV uptake is higher and occupies a greater share of the overall car fleet.

Figure 1-2: EV Charge point to ULEV distribution, Northern Ireland (2020)



1.4 EV technologies such as full battery electric or BEVs and plug-in hybrid electric or PHEV models are attractive options to help reach environmental, societal and health objectives. In addition to being two to four times more efficient than conventional internal combustion engine models, ULEVs can reduce reliance on oil-based fuels and, if running on low-carbon power, can deliver significant reductions in greenhouse gas emissions. Plus, with zero tailpipe emissions, EVs are well suited to help reduce air quality and pollution issues.

1.5 In light of the UK government’s announcement of a ban of all new pure petrol and diesel car sales by 2030 and hybrid cars by 2035, the Department for Infrastructure, Northern Ireland has commissioned this study to understand the different options to develop EV uptake in

³ www.ecarni.com; ESB website

Northern Ireland, including policies to facilitate EV Charging across the region which will be used to inform its draft Energy Strategy due for publication at the end of 2021.

Structure of the document

1.6 This study consists of the following sections:

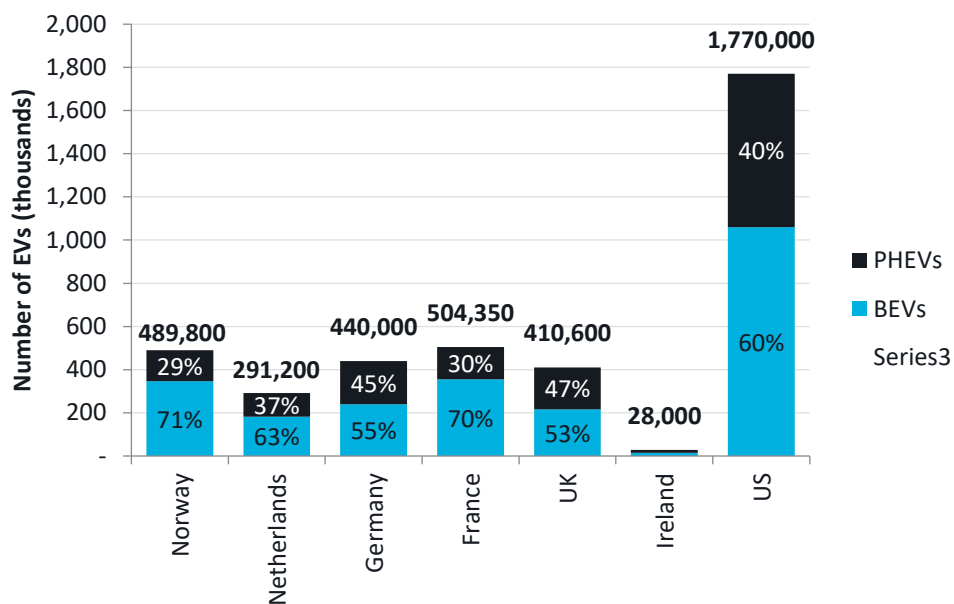
- **Chapter 2: International good practice review** which provides an overview of EV policies, and measures that has supported EV uptake across six countries including Norway, Germany, the Netherlands, France the US, and the UK.
- **Chapter 3: Potential opportunities and challenges** for EV development which provides an evaluation of current state of EV uptake in Northern Ireland, potential demand analysis, and identifies the key challenges and future opportunities, in consideration of the whole of Ireland's EV policies and infrastructure provision.
- **Chapter 4: EV uptake forecast** and corresponding charging requirements in Northern Ireland until 2050.
- **Chapter 5: Options and recommended measures** to facilitate transition to EVs in short to medium term.

2 International good practice review

Overview

- 2.1 This chapter presents an overview of the EV uptake in six countries (Norway, Germany, the Netherlands, France, North America, Ireland, the UK ,and a subset of data on Northern Ireland specifically where different from the UK). This is followed by an analysis of the key factors that have influenced the uptake of EVs in these countries, for example any EV incentives, policies, and funding initiatives.
- 2.2 Global EV uptake is increasing year on year, with 3.24 million plug-in EV sales in 2020, a 43% increase on sales in 2019⁴. This growth is driven by a particularly strong performance in Europe, which saw EVs hold a 11% market share of all vehicle sales in 2020, a 142% increase on 2019⁵. Figure 2-1 presents the total number of EVs registered in each of the six target countries.

Figure 2-1: Total number of registered EVs (2020)



⁴ <https://www.spglobal.com/platts/en/market-insights/latest-news/oil/060321-saudi-aramco-raises-most-july-osp-s-for-asia-and-europe-leaves-us-unchanged>

⁵ <https://insideevs.com/news/482202/europe-world-biggest-plugin-electric-car-market-2020/>

- 2.3 Table 2-1 shows the market share of EVs in 2020 vehicle purchases and the number of EVs per public charge point in each of these countries. Note that for the latter measure, the Alternative Fuels Infrastructure Directive (AFID), the key policy regulating the deployment of public charging infrastructure in the European Union, recommend 1 public charger per 10 EVs, a ratio of 1:10 in 2020 as sufficient public charge point provision.

Table 2-1: Comparison of public charge points and xEVs share in vehicle purchases, 2020

Country	ULEVs share in vehicle purchases (2020)	ULEVs per public charge point (2020)
Norway	74.3%	24
Netherlands	23.0%	5
Germany	13.5%	13
France	11.2%	9
UK	10.7%	13
Northern Ireland	4.7%	14
Ireland	19.7%	19
USA	1.8%	67

- 2.4 Whilst North America has the greatest total number of registered EVs (ranks 2nd worldwide, after China), EV uptake relative to the size of the vehicle market is weak with just 1.8% of 2020 vehicle purchases being electric. Similarly, their public charging provision is well over the AFID recommendation at 67 EVs per public charge point, highlighting the sluggish development of the EV market in the USA. However, as the US has a high proportion of households with access to a garage or a carport (63%)⁶, this may mean that lower ratios of public charging infrastructure are needed, as more people can charge at home and do not need public charging infrastructure as often.
- 2.5 In contrast, in Europe, Norway and the Netherlands have well developed EV markets. Norway is a frontrunner, in 2020 it was the first country to have over half (54.3%) of new vehicle purchases being Battery Electric Vehicles (BEVs). The Netherlands has deployed a particularly comprehensive public charging network, with just 5 EVs for every public charging station and provision still has strong growth, with a government plan to add 213 new charge points per every working day in 2021⁷. 7 out of 10 Dutch households rely on public parking so a thorough public charging network is key to facilitating increased EV adoption. Over the past 10 years, along with national government investment initiatives, Dutch cities have been influential in the strong roll out of public charging infrastructure, securing infrastructure by collaborating in regional concessions⁸.
- 2.6 Germany, France, and the UK fair similarly to each other (with 9-13 EVs for every public charging station). Please note that Northern Ireland accounts for less than 1% of UK EVs, with

⁶ 2015 American Housing Survey

⁷ <https://www.iamexpat.nl/expat-info/dutch-expat-news/millions-invested-dutch-charging-network-electric-cars>

⁸ <https://english.rvo.nl/sites/default/files/2020/10/Factsheet%20The%20National%20Charging%20Infrastructure%20Agenda.pdf>

just 4,818 registered EVs. Due to factors such as high purchase price, lack of awareness and charging and range anxiety (further explored in Chapter 3), EV uptake in Northern Ireland is low, at around 3-4 years behind the UK average, and there is a need for growth in the EV market of Northern Ireland.

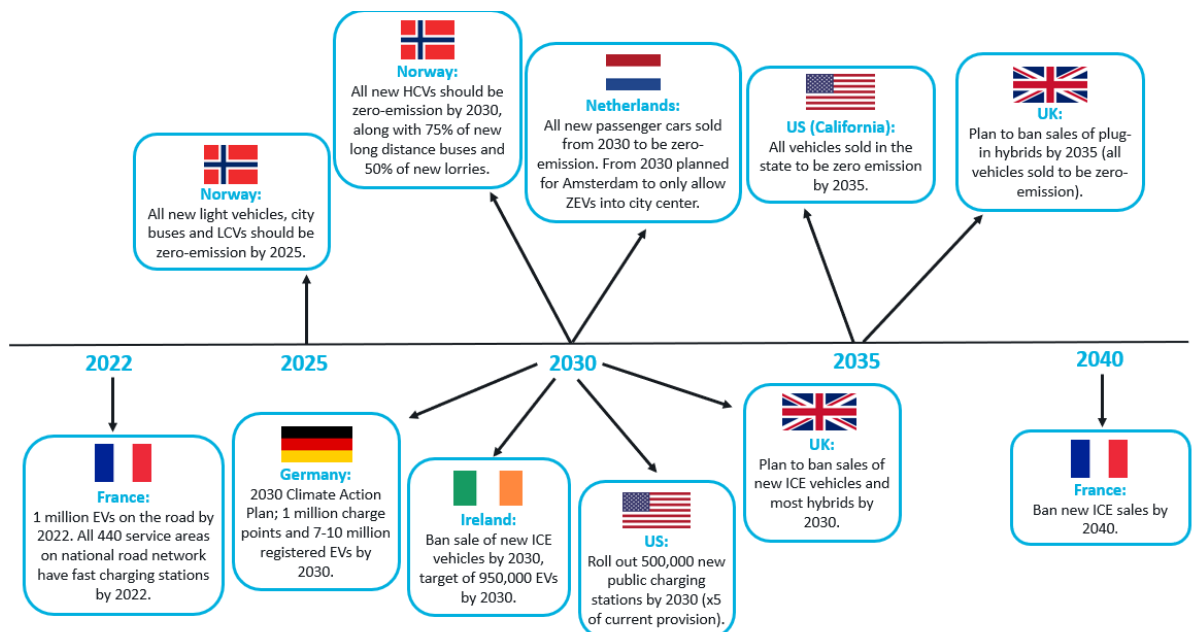
Key factors affecting EV uptake

2.7 We have reviewed the EV policies, targets and incentives implemented across the seven countries and this section aims to provide insights on how different countries have successfully led a transition to EVs.

Policy targets

2.8 Each country has set EV targets, some more progressive than others. These are displayed in Figure 2-2 below.

Figure 2-2: International EV targets



Incentives

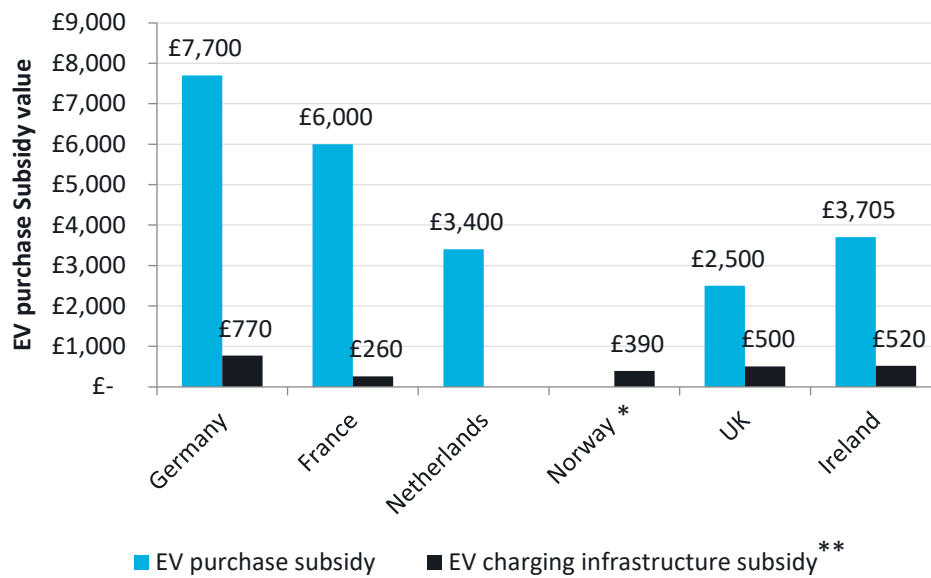
2.9 Looking across the six countries, there are a range of monetary and non-monetary incentives that have been implemented to promote the uptake of EVs and EV charging infrastructure.

2.10 Comparing the monetary incentives offered in the UK to those offered in the other countries included in this review, whilst the UK offers a similar range of incentives (subsidies and tax breaks), the value of the UK EV purchase subsidies is considerably lower than the offering in the other European countries examined. On the other hand, the value of the private charge point subsidies is on the high side of the range offered, only being superseded by Germany. This data is presented in Figure 2-3, the subsidies have been converted to British Sterling using the May 2021 exchange rate of 1 EUR: 0.86 GBR⁹.

⁹ https://www.iban.com/currency-converter?from_currency=GBP&to_currency=EUR&amount=1

- 2.11 Note that whilst Germany offers EV purchase subsidies that are more than triple the value of that offered in the UK, as presented earlier in this chapter the market share of EV purchases in 2020 does not reflect this stark difference in subsidy value. When analysing the funding mechanisms of the EV purchase incentives offered, it is important to note that uniquely in Germany there is an arrangement between the automakers and the government, with each contributing to 50% of the incentive funding. In other countries the funding typically has the government as the sole source.
- 2.12 In 2020 the market share of EVs in new vehicle purchases was 10.7% in the UK and just 1.25 times higher in Germany at 13.5%, emphasizing that EV ticket price purchase subsidies are not the only contributor to increasing EV uptake. There are a host of other contributors that culminate to encourage EV uptake, including the local market conditions including customer attitudes, charging infrastructure incentives, non-monetary incentives, and other monetary incentives, for example in the form of tax breaks.

Figure 2-3: EV ticket price purchase incentives



Source: Steer desktop research. *no EV charging infrastructure subsidy in the Netherlands, no EV ticket price purchase subsidy in Norway (instead they offer progressive tax breaks). **EV charging subsidy presented is for the private installation of a charge point.

- 2.13 Across these countries there are also a range of non-monetary incentives available. These typically surround parking privileges and access to High Occupancy Vehicle (HOV) or bus lanes, full details can be found in Appendix – A. The offering of these non-monetary incentives is typically focused on urban areas, where congestion and parking provides a greater disruption to travel.
- 2.14 In terms of which incentives are successful in boosting market share of EVs, as mentioned above countries that have had success such as Norway and the Netherlands have taken an all-rounded approach to create market conditions that encourage the uptake of EVs. Both Norway and the Netherlands structuring taxes to minimise the overall purchase price difference between EVs and ICE vehicles, with Norway going as far as to almost achieve price parity. Furthermore, both countries have taken different measures to ensure the market encourages EVs. For example, Norway has the world’s longest history in terms of EV

incentives, with incentives dating back to as early as 1990, meaning that EV awareness is strong and customer attitudes have had time to shift in favour of EVs as the concept is not as novel as in other countries. In the Netherlands the common barrier of lack of EV awareness and charging infrastructure has been combatted through an intense roll out of public charging infrastructure.

Funding

- 2.15 Funding arrangements for EV initiatives and incentives also vary between the countries. An example is that in Germany and France the government has organised COVID recovery stimulus packages that encourage restructuring of the automotive industry. In France this involved plans to dedicate €1.3 billion for temporarily increased purchase incentives and in Germany €2.5 billion for the same, along with EV charging infrastructure and vehicle battery production and assembly. It is important to note that whilst countries have national funding, there is also a strong provision of local funding, whether it be at the municipal or state level. Further details are presented in the [Appendix A](#).
- 2.16 Looking at charging provision, most governments have Public Private Partnership (PPP) support programmes. The relative infancy of the EV market means that commercial viability for charging operators is a key concern, to combat this and encourage market participation the German government has agreed to close the medium or long-term profitability gap of operators¹⁰.

Key Takeaways

- 2.17 In conclusion, based on the literature review, we found that whilst purchase incentives drive EV uptake, an even more powerful approach is to use taxation to penalise ICE vehicles whilst rewarding EVs, to lower the purchase price gap between ICE vehicles and EVs. France has taken this approach through a “Bonus Malus” scheme, and Norway and the Netherlands have successfully achieved strong EV uptake with the approach of minimising the price gap.
- 2.18 Furthermore, the availability of public charging network improves consumer confidence in EVs and is also beneficial in increasing EV awareness. The more public charging stations there are, the greater visibility vehicle owners have on the EV charging process, increasing their confidence in the charging process. Most countries have developed short term targets for the roll-out of public charging infrastructure (e.g., Germany 50,000 charge points by end of 2022, France 100,000 by end of 2021). Given that Northern Ireland does have a public charging network, short term focus should be on assuring the reliability of this network, whilst also increasing the visibility on home and workplace charging options. In addition, countries have specific targets or plans surrounding the development on fast charging infrastructure on the major highway network (e.g., France, Netherlands).
- 2.19 Public-private partnerships are essential for EV charging infrastructure market development, with almost all countries using this approach. Whilst it is acknowledged that in the early stages of development, the EV charging infrastructure market is rarely profitable, it is essential for the private sector to have public sector support to build the networks, which will facilitate growth of the market and hopefully a move to profitability in the future. This does not necessarily have to be in the form of state government financial support, in the case of the

¹⁰ <https://www.electrive.com/2020/06/18/1000-dc-charging-sites-now-the-german-government-is-building-superchargers/>

Netherlands city municipalities have been working together in regional concessions for public charging infrastructure, requiring little additional government investment.

- 2.20 Finally, the literature review has highlighted that there is not one solution to encouraging growth of the EV market. Progressive government targets, both monetary and non-monetary incentives, sufficient funding programmes and a comprehensive charging infrastructure network along with a definitive approach to charging infrastructure development have all contributed to successful EV market development in leading countries such as Norway and the Netherlands.

3 Potential opportunities and challenges for EV development

Overview

- 3.1 The UK Climate Change Act 2008 legislated for an 80% mandatory cut in the UK's carbon emissions by 2050 (compared to 1990 levels). This target was revised in 2019, now requiring the UK to bring all greenhouse gas emissions to Net Zero by 2050 (100% reduction compared to 41% today). The UK Sixth Carbon Budget (2033-2037) recommends the Government legislate for a reduction in UK emissions of 78% by 2035¹¹ which was approved in April 2021¹².
- 3.2 Transportation accounts for 20% of greenhouse gas emissions in Northern Ireland¹³, and looking to the whole of the UK, while transportation accounts for about 27% of greenhouse gas emissions in the country, about 91% of those emissions come from road transport¹⁴. With a UK-wide renewed focus on tackling climate change, including a ban on sale of pure diesel and petrol cars by 2030, and the Net Zero being considered 'integral to the COVID-19 recovery', the development of EV market will remain a key objective for the next decade.
- 3.3 EV adoption rates in Northern Ireland are lower than in other parts of the UK, with a relatively low number of registered EVs (4,818 (2020), including 2,549 BEVs and 2,103 PHEVs, 0.8% of UK total compared to 3.0% share in UK total registered vehicles¹⁵). This is further supported by the Northern Ireland Continuous Household Survey 2019/2020 finding that whilst 23% of respondents are strongly considering that their next vehicle purchase will be an EV, only 2% are certain of it¹⁶.
- 3.4 This means becoming more energy efficient, switching fuels, changing transport modes, and replacing inefficient infrastructure should be a policy priority for Northern Ireland.

EV policies and incentives

- 3.5 The UK government policies and incentives that apply in Northern Ireland include the following:
- Emission-based vehicle road taxes (VED) and Benefit-in-kind company car tax.

¹¹ [Policies-for-the-Sixth-Carbon-Budget-and-Net-Zero.pdf](#)

¹² <https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035>

¹³ [NI Greenhouse Gas Statistics 1990-2019 2.pdf \(daera-ni.gov.uk\)](#)

¹⁴ [The Road to Zero \(publishing.service.gov.uk\)](#)

¹⁵ DfT Vehicle Statistics 2020 data

¹⁶ [Attitudes towards electric vehicles in Northern Ireland 2019 2020 \(infrastructure-ni.gov.uk\)](#)

- The Office for Zero Emission Vehicles (OZEV, formerly OLEV) operates several grant schemes¹⁷ that Northern Irish consumers qualify for include:
 - Plug-in Vehicle grants, for manufacturers and distributors of plug-in vehicles – the maximum grant available for cars is £2,500 and for vans £6,000.
 - Plug-in Taxi grants of up to £7,500, for new purpose built taxis with CO2 emission of less than 50g/km and can travel at least 112 km without any emissions.
 - The Electric Vehicle Homecharge Scheme (EVHS) provides grant funding of up to 75% towards the cost of installing electric vehicle chargepoints at domestic properties across the UK.
 - The Workplace Charging Scheme (WCS) is a voucher-based scheme that provides support towards the up-front costs of the purchase and installation of electric vehicle charge-points, for eligible businesses, charities, and public sector organisations.
 - The On-street Residential Chargepoint Scheme (ORCS) provides grant funding for local authorities towards the cost of installing on-street residential chargepoints for plug-in electric vehicles.
 - Ultra-Low Emission Taxi Infrastructure Scheme.
- Supply-side measures (e.g., R&D Tax Credits¹⁸) to support ULEV manufacturers are covered by UK-wide policy (e.g., the Industrial Strategy and Automotive Sector Deal).

3.6 While there are grants and incentives available through UK-wide initiatives, lower EV awareness and user uptake means there is a role for the Northern Ireland Executive government to play through devolved policy and actions that further encourage the uptake of EVs, to ensure they meet the emission reduction targets.

3.7 To facilitate a smooth transition to EVs, it is imperative to understand the key opportunities and challenges that prevail in the EV market in Northern Ireland, and what measures would drive EV uptake. In this chapter we explore these opportunities and challenges under three themes:

- Trends in the EV market
- User analysis
- Charging infrastructure provision in Northern Ireland

Trends in the EV market

3.8 The EV market is evolving rapidly, especially with regard to advances in technology and innovation by EV manufacturers. These technological advances are important to consider when exploring some of the challenges currently faced by EV users (presented later in this chapter), as examples such as range anxiety, or cost of vehicles will increasingly be mitigated as technological advances continue to occur. Some of the key trends in the current EV market are summarised below.

Electric cars had a record year in 2020, despite COVID-19

3.9 With the exception of NI where car sales have increased by over 30,000 since 2018, the rest of the UK car market contracted slightly in 2020. However, new electric car registrations in the UK more than doubled to reach 176,000 and registered vehicles, representing a sales share of

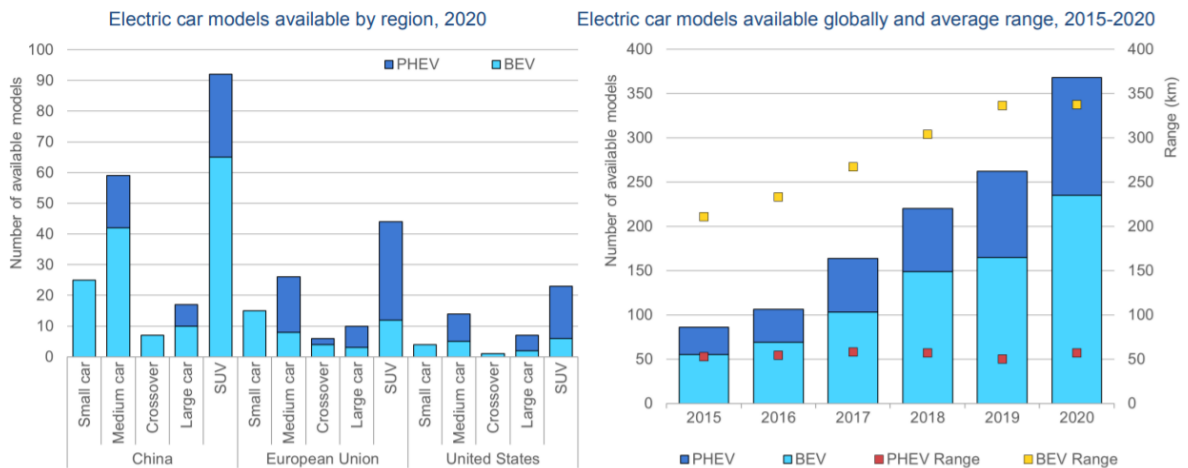
¹⁷ <https://www.gov.uk/government/collections/grants-for-plug-in-vehicles>

¹⁸ [Funding and Support - SMMT](#)

10.7%. BEVs alone accounted for almost two-thirds of these new electric vehicles sales. In Northern Ireland too, 1,200 EVs were sold in 2020, compared to only 500 in 2019¹⁹.

- 3.10 This surge in UK electric car registrations despite the economic slump confirms the increasing consumer confidence in EVs with rising EV choices, alongside the ongoing EV incentives and benefits, alongside a continued growth in EV Charging infrastructure.
- 3.11 As of March 2021, manufacturers have already launched more than 150 EV models to the UK market. BEVs and PHEVs alone account for 25% of all available car models in the UK. The top 5 EV models sold in the UK include Tesla Model 3, Jaguar I-Pace, Nissan Leaf, Kia Niro, and Renault Zoe.
- 3.12 Driven by the EU CO2 standards for 2020/21 that required carmakers to reach on average 5% EV sales share in 2020 and up to 10% in 2021 or face fines, the offer of better performing and more affordable electric vehicles are expected to double. The number of electric models available on the European market is expected to surpass 200 in 2021. The average battery range of new BEVs has been steadily increasing as well. In 2020, the weighted average range for a new battery electric car was about 350 kilometres (km), up from 200 km in 2015.

Figure 3-1: Electric car models and average range



Source: International Energy Agency (IEA)

EV prices continue to fall, with advances in EV battery technology

- 3.13 The UK government has set a clear goal to end the sale of all new pure petrol, diesel cars and vans in 2030. This means the UK automotive industry is required to make a more significant and advanced commitment to meet the legislation than any other major car or van market. To date 18 of the 20 largest OEMs have already announced their commitment to increase their offer and sales of EVs.
- 3.14 The higher costs of EV components and their raw materials compared to ICE vehicles is the main deterrence to EV growth. This is attributable to the batteries that have the biggest impact on cost representing 30-45% of the total cost of production. The industry believes a

¹⁹ DfT vehicle statistics <https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01#licensed-vehicles>

move towards mass electrification can significantly lower lithium-ion (Li-ion) battery cell costs when economies of scale will be reached²⁰.

- 3.15 Nonetheless, the prices of batteries have fallen by 89% since 2010, from \$1,100 in 2010 to about \$137 in 2021. If the experts are to be believed, this will reach \$100 by 2023 – the price point at which EVs are as cheap to make as gas-powered cars²¹.
- 3.16 Some of the recent announcements by vehicle manufacturers further confirms the industry is moving towards mass electrification, e.g., Volvo pledged to only sell electric cars from 2030; Jaguar will be all electric from 2025; Ford will only sell electric cars in Europe from 2030; General Motors plans to offer only electric vans by 2035; Volkswagen aims for 70% electric car sales in Europe by 2030.

Technological developments in EV charging Infrastructure

Vehicle development and move to 800 V EV architecture

- 3.17 The requirement to upgrade the vehicles architecture to 800V only becomes necessary if users are going to be able to accept and take advantage of the higher-powered charge and faster charging times. Heat generated from the charging cables and connectors, in particular when charging at DC fast chargers needs to be managed along the current path within the vehicle and subsequently its componentry. As battery technology and cell chemistry improves, the ability for a vehicle to accept higher rates of charge and the time required to charge will also improve.
- 3.18 The current majority of EV's run on a 400V architecture, however as new ground up platforms have been announced in the last year, the move to the 800V systems have started to be announced. The Porsche Taycan was one of the first vehicles developed with an 800V system, and most recently both Kia and Hyundai have announced the use of the 800v system as part of their new electric Global Modular Platform (E-GMP). It is foreseeable that an OEM's EV offering could diverge between the two systems based on the vehicle specifications and price point of the vehicle.

Charging Speeds

- 3.19 Charging speeds and range are important to the customer, they are both the headline figures used to sell a vehicle and are considered by customers irrespective of their typical daily mileage or that in majority of user cases charging in less than ten minutes is not an everyday requirement. Therefore, it is important to recognise that customers want to be able to access the best solution they can however far they drive or wherever they charge.

High Powered Charging (HPC)

- 3.20 Historically the majority of high-powered charging stations deployed to support the EV market have been 50kW. With the exception of Tesla and their proprietary Tesla Supercharger network (currently accessible to Tesla vehicles only) which initially operated at 120kW but has recently upgraded some locations with their V3 stations capable of delivering a peak charge rate of up to 250kW.

²⁰ According to Wright's Law, also known as the learning curve effect, battery costs fall by 28% for every cumulative doubling of units produced.

²¹ [Batteries For Electric Cars Speed Toward a Tipping Point - Bloomberg](#)

- 3.21 However, in the last 2 years the emergence of higher-powered charging stations (120kW – 350K) on the public charging network has become a prominent discussion point in the context of reducing barriers to EV ownership. The HPC station provides users with a charging speed that is considered closer to that in charge time to that of a petrol station fill up, allowing an 80% charge in as little as 18 minutes on a 350kW Rapid Charger²². The location and setup of the HPC networks to date have been primarily been focused and is growing around the major road network and places where drivers need and require a faster top up in order to continue their onward journey.
- 3.22 Charging at high power has become an important EV selling specification in conjunction with vehicle range. Porsche were first to announce that the new Porsche Taycan would be capable of charging at 350kW, the vehicle was launched with a charging speed of 270kW with the promise of a 350kW option due later this year. At present no other passenger vehicle has reported the release of a vehicle capable of charging at 350kW, with the majority of vehicles on the market currently having a DC charging capability of 50 - 150kW.

Induction / Wireless Charging

- 3.23 Induction / Wireless charging provides a way to put charge (energy) into a vehicle without the need for a charging cable. The system relies on resonant magnetic induction to transfer energy between a pad on the ground to another pad positioned on the underfloor of the vehicle. Wireless signals between the vehicle and charging system are used to align the vehicle, start, and stop charging.

- 3.24 At present the majority of induction charging systems are static as opposed to dynamic (in motion charging). Electric vehicle manufacturers are all interested in the application of wireless charging recognising the convenience of not having to carry or handle charging cables. However, to date the cost of implementing both on the car and in the intended location have been considered high. In addition to cost, there are a number of application issues that need to be addressed in order for the system to be fully utilised.



Source: WiTricity

- 3.25 At present Wireless (Induction) charging seems best suited in supporting defined fleet applications rather than a home solution or general public charging solution. This is because the predictability and control over the fleet and the location of the pads can be tailored specifically to meet the vehicle models in operation. To date we have seen a number of trials and pilots across the world that are set up around taxi and bus fleets.
- 3.26 The future of wireless charging and its growth will be hindered by the ability of both the infrastructure and vehicle manufacturers' ability to come together on the standardisation and

²² Charging times will vary based on vehicle type and specification.

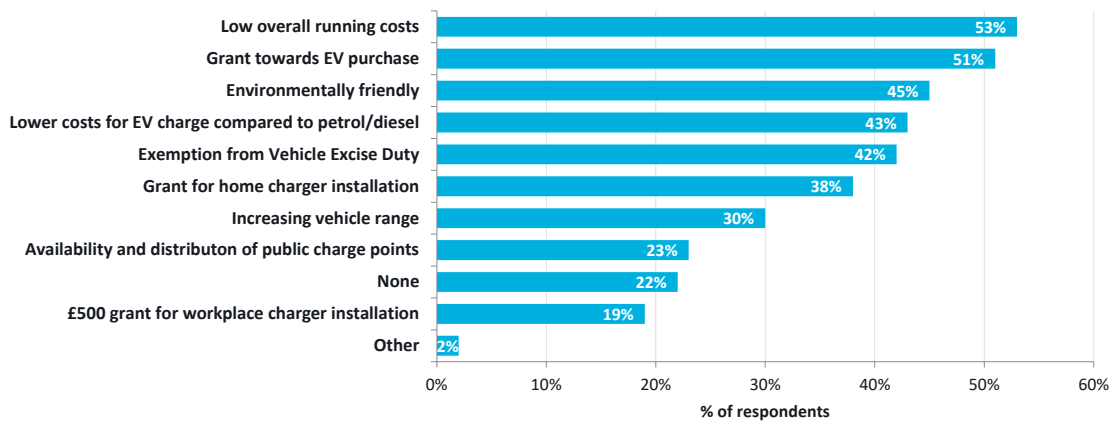
interoperability of the entire system both on vehicle and in real estate locations. However, it is possible to foresee this technology will be of greater value in the future when the introduction of Connected and Autonomous Vehicles (CAVs) become more prominent in the market over the next 5 years as autonomous vehicles become more widespread in use and the need to charge without human interaction is required.

User analysis

Drivers of EV adoption

3.27 Despite sluggish EV adoption so far, the Northern Ireland Continuous Household Survey 2019/2020 identified certain key drivers to EV adoption in Northern Ireland. These include the low overall running costs of EVs (53%), the grant available for EV purchase (51%)²³, environmental reasons (45%), lower power costs relative to ICE fuel costs (43%) and the exemption from Vehicle Excise Duty (42%).

Figure 3-2: Drivers of EV adoption (NI Continuous Household Survey 2019/2020)



Source: Steer presentation of Northern Ireland Continuous Household Survey 2019/2020 results

3.28 The opportunities identified by the Continuous Household Survey 2019/2020 are in line with findings from other studies. A TfL study in 2015 found that financial and environmental gains cited as the primary motivators for EV purchase, along with a confused.com survey in 2018 finding environmental reasons to be a key motivator. Furthermore, in support of the Survey funding incentives such as the UK purchase grant and the OLEV EV Home and Workplace Charging Scheme were deemed to be key drivers of EV adoption. A further study carried out by the Norwegian Centre for Transport Research Survey (2016) also found a strong correlation between strong supporting incentives and EV purchases.

Barriers to EV adoption

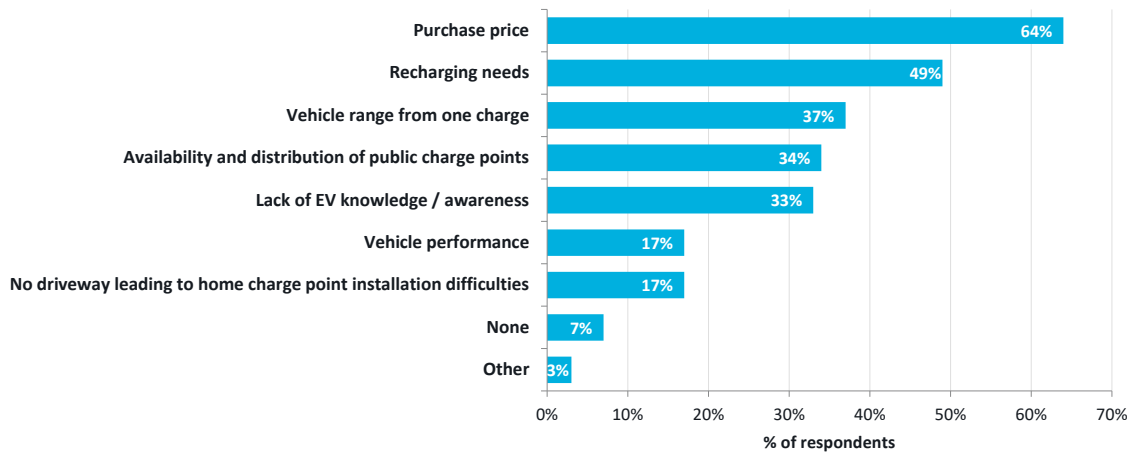
3.29 On the other hand, the Northern Ireland Continuous Household Survey 2019/2020 found that 42% respondents would not consider buying an EV for their next vehicle purchase (purchase when) and a further 33% stated that it would be unlikely. Of those who said they would consider buying an EV for their next vehicle purchase, the majority (51%) said this purchase

²³ The grant amount was £3,500 when the survey was conducted, it was lowered to £2,500 in 2020

would be within the next 2-5 years. This indicates that there are still significant barriers to EV adoption.

- 3.30 The key barriers to EV adoption identified by survey respondents include purchase price (64%), recharging needs (49%), range concerns (37%), public charge point availability and distribution (34%) and lack of EV knowledge or awareness (33%).

Figure 3-3: Barriers to EV adoption (NI Continuous Household Survey 2019/2020)



Source: Steer presentation of Northern Ireland Continuous Household Survey 2019/2020 results

- 3.31 Once again, these barriers identified in the NI Continuous Household Survey are consistent with those identified in other UK studies, proving that the current barriers to EV adoption are not unique to Northern Ireland, these are issues facing all UK consumers. For example, in a survey conducted by Connected Kerb in 2020²⁴, respondents indicated cost (53%), access to charging (45%) and range (38%) as barriers for EV purchase. In addition, In the “Key factors defining the e-mobility of tomorrow” report (2018)²⁵, Capgemini referenced driving range, diversity of EV models, price and charging anxiety as the primary barriers to EV adoption.
- 3.32 It is interesting to consider that the monetary components of EVs are identified as both the key opportunities and barriers for adoption. This is due to the short term, initial cost of an EV being greater than that of an ICE vehicle, but that the long-term running costs (costs post initial purchase) are lower for EVs than for ICE vehicles. Therefore, whilst purchase price is cited as the top barrier to EV adoption, when looking at the longer-term costs of buying an EV the higher initial purchase price may be compensated. This implies that greater awareness on shifting consumer focus to the total cost of ownership (TCO) comparison between EVs and ICE vehicles, rather than initial purchase price.
- 3.33 In addition, as technology develops as well as economies of scale in the supply, EV prices are also forecast to decrease. Bloomberg currently predict that cost parity with ICE vehicles will be in the 2027 timeframe.

²⁴ [CK Electric Vehicles Report Moving from early adopters to mainstream buyers \(1\).pdf \(connectedkerb.com\)](#)

²⁵ [Capgemini-Invent-EV-charging-points.pdf](#)

EV charging infrastructure provision in Northern Ireland

- 3.34 In this section we present an overview of the current provision of charging infrastructure in Northern Ireland, highlighting some of the key issues facing the network. In addition, we present the findings of our analysis into the geographical distribution of potential EV demand in Northern Ireland, indicating specific Local Government Districts that stand as opportunity areas for further public charging development.
- 3.35 There are currently 337 public charge points available across Northern Ireland, with plans to include an additional estimated 20 rapid charge points as part of the Interreg FASTER project. The majority of the current public EV charge points were installed 10 years ago in 2011 as part of the Plugged-In Places initiative which is owned, operated, and maintained by The Electricity Supply Board (ESB), Ireland. At present the public network is also free to use.
- 3.36 While it could be considered that there is a sufficient number of charge points per EV in the region (1:14 compared to 1:13 UK wide), maintaining the reliability of the network is a challenge. Reliability of charging is one of the main complaints cited by current EV users when charging in public and would therefore be detrimental in the encouragement and take up of EV adoption if users felt they did not have access to a reliable network.
- 3.37 In addition, some of the charge points have become difficult to maintain and service due to non-availability of parts, while others are no longer compatible with any updates e.g., the ESB App. The short-term issue, is therefore, the refresh of the existing hardware to those that are of the latest specifications and can be reliably maintained.
- 3.38 There is not only a need for additional charge points to meet the increasing demand for public charging as EV uptake grows into the future, but from present day it is critical to upgrade the network so that it is reliable, compliant with quality standards, competent for routine servicing and maintained.
- 3.39 Below we present our analysis on the geographical distribution of EV demand and Electric Vehicle Charge Point (EVCP) demand across Northern Ireland.

Geographical distribution of potential EV demand across Northern Ireland

- 3.40 As mentioned above, to establish potential relative demand for charging infrastructure we have conducted an analysis of the underlying demand for EVs across Northern Ireland.
- 3.41 We developed a ranking model which calculates an EV Demand Index for each the Local Government District (LGD) across Northern Ireland, with a rank being assigned for each LGD. The index has been calculated based on the seven criteria as presented in Table 3-1 below.

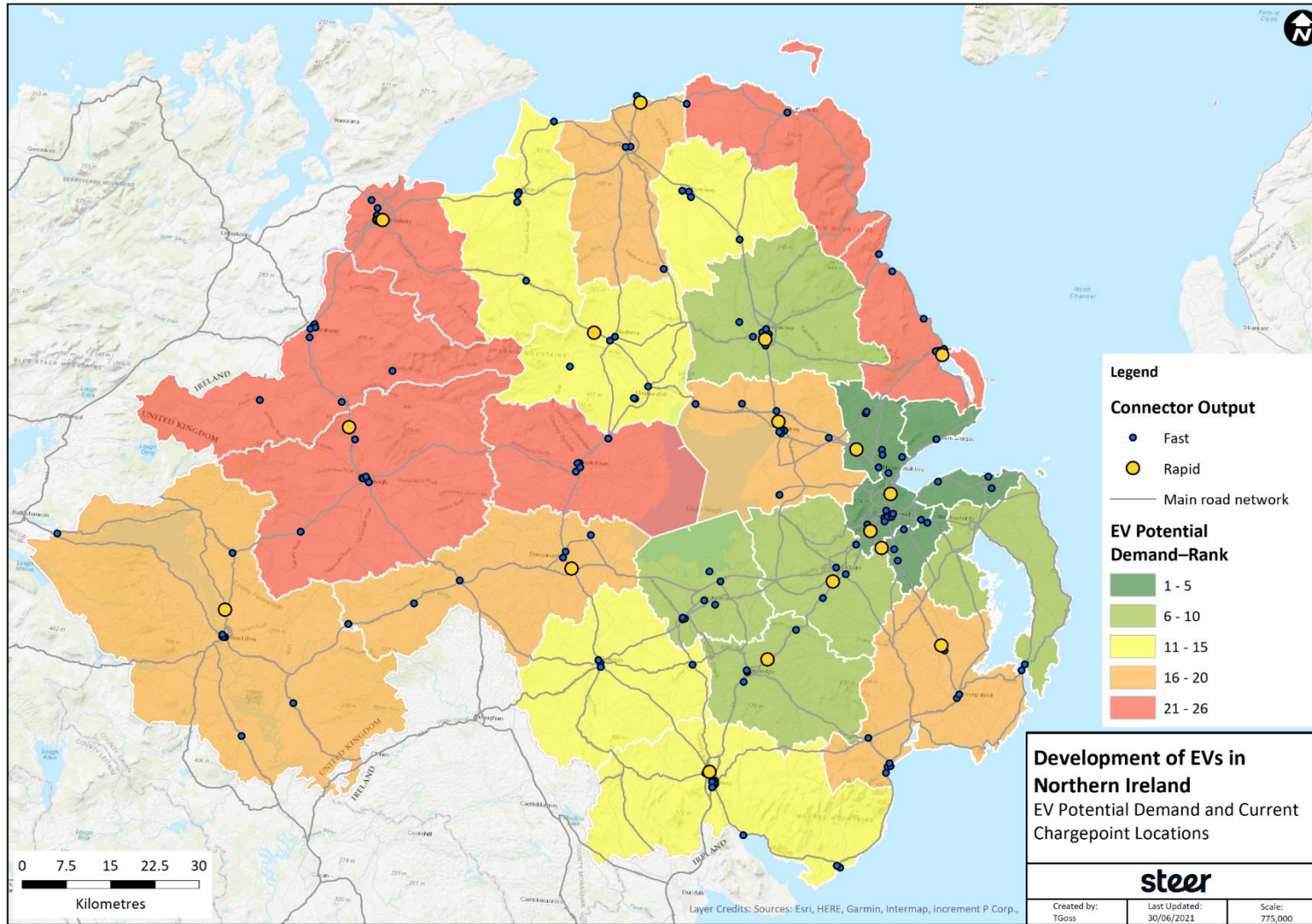
Table 3-1: EV demand index data sources

Factor	Description
Population density	Population density of the LGD. A higher population density suggests a greater potential demand for EVs and therefore, EV infrastructure requirements.
Employment density	Employment density of the LGD. A higher employment density would suggest a greater potential demand for EVs.
% Urban settlement	Proportion of urban settlement within the LGD. A higher proportion of urban settlement indicates higher EV demand.
% Households with access to a car	Proportion of households with access to a car. Higher access rates would indicate potential for switching to an EV.
Residential type - Driveway	Proportion of households likely to have access to a driveway, driveway availability potentially requires fewer on street chargers.
Commuting - % driving	Proportion of driving commuting trips. These trips could switch to EVs.
% of target Mosaic groups	Proportion of total population highlighted as an EV target group (City Prosperity, Domestic Success).

- 3.42 We have used the geodemographic profiling tool Mosaic to consider consumer behaviour and characteristics towards new technology such as EVs. ‘City Prosperity’ and ‘Domestic Success’²⁶ were chosen as the target Mosaic groups and these types are more likely to be the early EV adopters and users. This correlates with the research which suggest early EV adopters are likely to have relatively high level of income or education, be in a financial position to act upon their environmental concerns and aspire to adopt technology.
- 3.43 The value for each of the factors is reported for each LGD. The rank of the LGD is calculated by comparing its position with respect to the best scoring LGD. This is carried out factor by factor, and then summed to calculate the LGD’s overall Index value, and the ranking in terms of the propensity of residents of the LGD to adopt EVs. Each factor is weighted equally.
- 3.44 On the map (Figure 3-4) the LGDs with the highest rank are displayed in green and the lowest ranking in red. The high ranking LGDs are those with the highest propensity to adopt an EVs and therefore likely to require a greater number of Electric Vehicle Charge Points (EVCPs).
- 3.45 To show the current distribution of public charge points across Northern Ireland we have also applied an overlay of the current distribution of Fast (blue) and Rapid (yellow) public charging points on the map.

²⁶ ‘Domestic Success’ are high-earning families who live affluent lifestyles in upmarket homes situated in sought after residential neighbourhoods. “City prosperity” are those living in high-end properties and having luxurious lifestyle.

Figure 3-4: EV potential demand ranking



- 3.46 As could be expected given its urban nature, Belfast is the top ranking LGD in terms of potential for EV demand. The Top 10 ranking of LGDs are displayed in Table 3-2.
- 3.47 Focusing short-term measures to incentivise EV uptake on the top ranking LGDs such as Belfast, Castlereagh, North Down will help drive the transition to EVs faster as users in these LGDs are more likely to adopt an EV. Some of the measures may include local monetary and non-monetary incentives, policy support to develop the rapid charging network, and other supporting policy interventions.

Table 3-2: Top 10 LGD ranking for potential EV demand

Rank	LGD
1	Belfast
2	Castlereagh
3	North Down
4	Carrickfergus
5	Newtownabbey
6	Craigavon
7	Lisburn
8	Banbridge
9	Ards
10	Ballymena

Source: Steer analysis

- 3.48 Overlaying the location of existing charge point provision on the map also helps identify the areas currently sparsely served with charge points compared to relative underlying demand. This will help Northern Ireland DfI to plan and develop a EV charge point implementation strategy.
- 3.49 This analysis finds/confirms that:
- the population living in urban areas have relatively lower access to a driveway, hence, the on-street charge point provision should focus on these areas, and
 - the current charge points provision in the rural areas is relatively lower, and this when compared to number of registered vehicles and car ownership rates/ car usage in these areas, there is a need to increase public awareness on EVs to drive EV uptake, alongside development of rapid charging network for longer journeys where home charging is not sufficient.

4 EV Uptake Forecast

EV uptake forecast by scenario

- 4.1 The transition to EVs is imminent, however, how fast it happens will partly depend on local initiatives and measures. We have developed three scenarios for future EV uptake to account for the evolving trends in the EV market, particularly the passenger cars segment.
- 4.2 The scenarios are adapted to the EV uptake forecasts for three scenarios in SONI Tomorrow's Energy Scenario's Northern Ireland 2020 study²⁷. These three scenarios being:
- **Modest Progress** – a world in which the pace of change is not sufficient to meet all climate objectives
 - **Addressing Climate Change** – a world in which citizens recognise climate change as a risk and take appropriate action, meeting Northern Ireland's Net Zero contribution by 2050
 - **Accelerated Ambition** – a plan led world in which Northern Ireland achieves a low carbon future and meet its Net Zero contribution in advance of 2050
- 4.3 We have considered a more bullish market outlook for all three scenarios until 2040, given the ongoing improvements in battery technology costs, wider availability of electric car models, uptake of EVs by fleet operators and enthusiasm of EV buyers witnessed in 2020. In addition, we believe the point of inflection, i.e., a paradigm shift towards EV has to happen before 2030 when sales of all new pure petrol and diesel vehicles will end.
- 4.4 These forecasts provide a guide to DfI on what levels of EV uptake can be achieved, and the corresponding local policies and interventions that need to be introduced to achieve these are included in the following chapter.
- 4.5 Some broad measures assumed while forecasting the EV numbers in each of the scenario are included below:
- **Modest Progress** – this scenario assumes the market will develop through market forces, with very limited policy interventions.
 - **Addressing Climate Change** – this scenario assumes interventions will be made in short to medium term (0-5 years) e.g., awareness campaigns, non-monetary incentives such as free parking for EVs, and encouragement for private operators to deploy EVCPs.
 - **Accelerated Ambition** – this scenario assumes aggressive policies and fiscal measures, along with rapid development of battery and charging technology. EVs are a preferred and more affordable option for users.
- 4.6 Table 4-1 summarises our assumptions on EV uptake forecasts and compares them with the EV uptake forecasts in the SONI study.

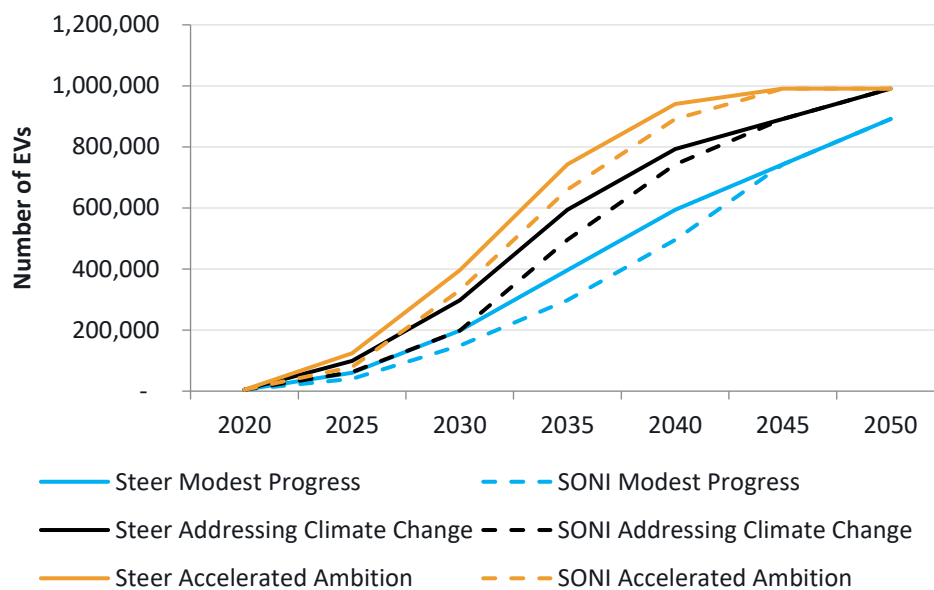
²⁷ [TESNI-2020.pdf \(soni.ltd.uk\)](#)

Table 4-1: EV uptake % by scenario

Scenario Name		2025	2030	2035	2040	2045	2050
Modest Progress	Steer Forecast	6%	20%	40%	60%	75%	90%
	SONI Study Forecast	4%	15%	30%	50%	75%	90%
Addressing Climate Change	Steer Forecast	10%	30%	60%	80%	90%	100%
	SONI Study Forecast	6%	20%	50%	75%	90%	100%
Accelerated Ambition	Steer Forecast	12%	40%	75%	95%	100%	100%
	SONI Study Forecast	8%	33%	67%	90%	100%	100%

4.7 We forecast there will be between 60,000 and 125,000 EVs in Northern Ireland in 2025 which will increase to 400,000 EVs by 2035 in the most conservative scenario (Modest Growth) and 750,000 EVs in Accelerated Ambition scenario. Figure 4-1 presents our forecast for EV numbers (passenger cars) in each of the three scenarios above.

Figure 4-1: EV forecasts for Northern Ireland, by scenario



EV charging requirements

4.8 Drivers need certainty that they can recharge their vehicle conveniently and on demand. For many, that means using a charging point at home. It is reported that 90% of trips in Northern Ireland are less than 10 miles, making them suitable for transition to an EV. Yet, one third of EV users in Northern Ireland say they aren't considering an electric vehicle because there is a lack of convenient charging locations, solving the charge point challenge will accelerate uptake.

Public charging (all types of charge points)

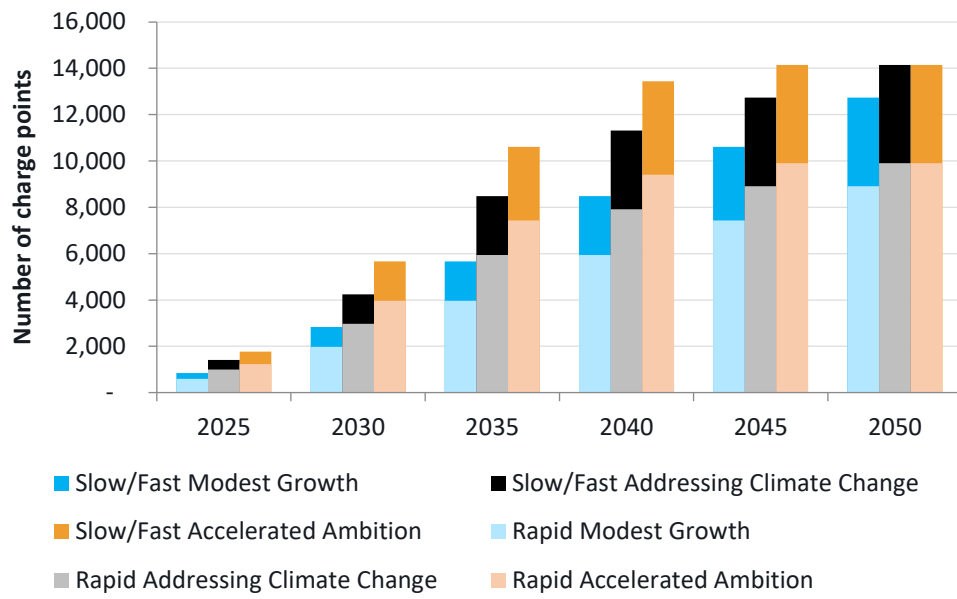
- 4.9 If Northern Ireland were to base their requirements on the IEA recommendations for EV public charge points to EV ratio of 1:10, Northern Ireland would require roughly 6,000 to 12,000 public charge points in its network in 2025 to meet the potential demand from EVs, based on the EV uptake rate in the scenarios shown previously (table 4.1).
- 4.10 This target, though desirable, is not only hard to achieve in short term when the EV market is still relatively small and rapidly evolving, but also does not address the nature of the country's requirements in consideration of the types and quantities of public charging provision needed.
- 4.11 As an example, the North American market has a 1:67 (per public charge point to vehicle) ratio. Although a still developing market, the high proportion of vehicles to charge point could be seen as a sign of the high proportion of households with access to a garage or a carport at (63%)²⁸. In contrast Northern Ireland has an even greater proportion of households with access to a driveway at circa 80%.
- 4.12 In contrast 7 out of 10 Dutch households rely on public parking so a thorough public charging network is key to facilitating increased EV adoption, and as such the ratio is 1:5.
- 4.13 In consideration of the public charge points to EV ratio in a market where the wider public charging network is likely to be less utilised due the availability of the potential access to home charging solutions, we would propose a charging ratio that is more aligned to that of the USA (1:70) as a baseline.
- 4.14 In consideration of the charge points to EV ratio of 1:70, Northern Ireland would require roughly 849 to 1,768 public charge points in its network in 2025 to meet the potential demand from EVs.

Rapid charging

- 4.15 Given the rural nature of the country and the high ratio of consumers who potentially have access to home charging solution, Northern Ireland's infrastructure development should focus on developing the rapid charging network which will help EV users top-up their vehicles as and when required such as during long distance trips, but also support the light commercial logistics and freight market within NI and connecting into the Republic of Ireland. Assuming an EVs to rapid charge point ratio of 1:100, Northern Ireland will require approximately 1,000 rapid charge points (Addressing Climate Change scenario) by 2025.
- 4.16 Figure 4-2 below presents the potential number of EV charge points required between 2025 and 2050 by each scenario based on the assumed charging point to vehicle ratios.

²⁸ 2015 American Housing Survey

Figure 4-2: EV Public Charge point requirements



Alternate model to evaluate Rapid Charging rollout plan

- 4.17 We have modelled a further scenario for rapid charging rollout, which is based on similar analysis undertaken as part of Project Rapid²⁹, which modelled the number of charging locations required on motorways and the strategic road network in England so that any resident would be within a 50 mile drive of a rapid charge point.
- 4.18 In respect to the size of Northern Ireland and England we have modelled both the 50 mile scenario and a lesser distance of 25 miles. Our high-level analysis is based upon the NI road network (OSM) data. This only considers total highway length and not spatial distribution of the network or population. The total length (excluding tracks, etc) used for the analysis is 8,432 miles.

Figure 4-3 and Figure 4-4 show the number of chargers and provides an illustrative representation of the placement locations of the chargers in order to establish a 25 mile and 50 mile distribution across Northern Ireland.

- 4.19 The high-level analysis presented in Table 4-2 only considers the number of charging point locations required; it does not take into the account the number of charging points at each location. To provide an illustrative example of the number of charging stations each scenario would represent we have assumed an initial market entry assumption of 2 rapid charging stations at each location, building up to 4 and 6 over time. Initial growth number selected is based on the early strategy of Ecotricity deployed at motorway service stations numbers to a more developed position in England where average installations have grown to 6.

Table 4-2: NI road network charge point location summary analysis

Distance from Charge Point Location (miles)	Number of Charge Point Locations	Total number of charging stations (based on 2 EVCP per location)	Total number of charging stations (based on 6 EVCP per location)
25	169	338	1014
50	84	168	504

²⁹ [Government vision for the rapid chargepoint network in England - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/consultations/government-vision-for-the-rapid-chargepoint-network-in-england)

Figure 4-3: Potential EV Charge point coverage – 25 mile catchments

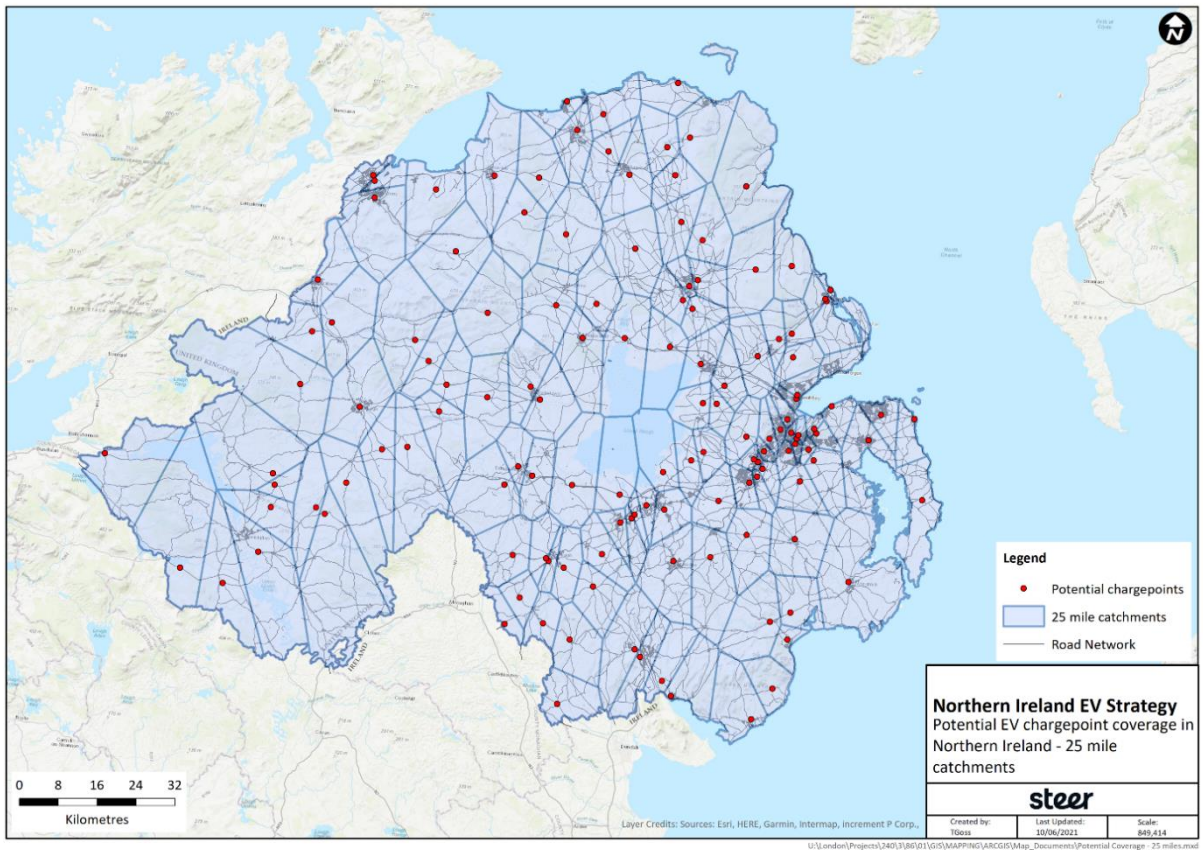
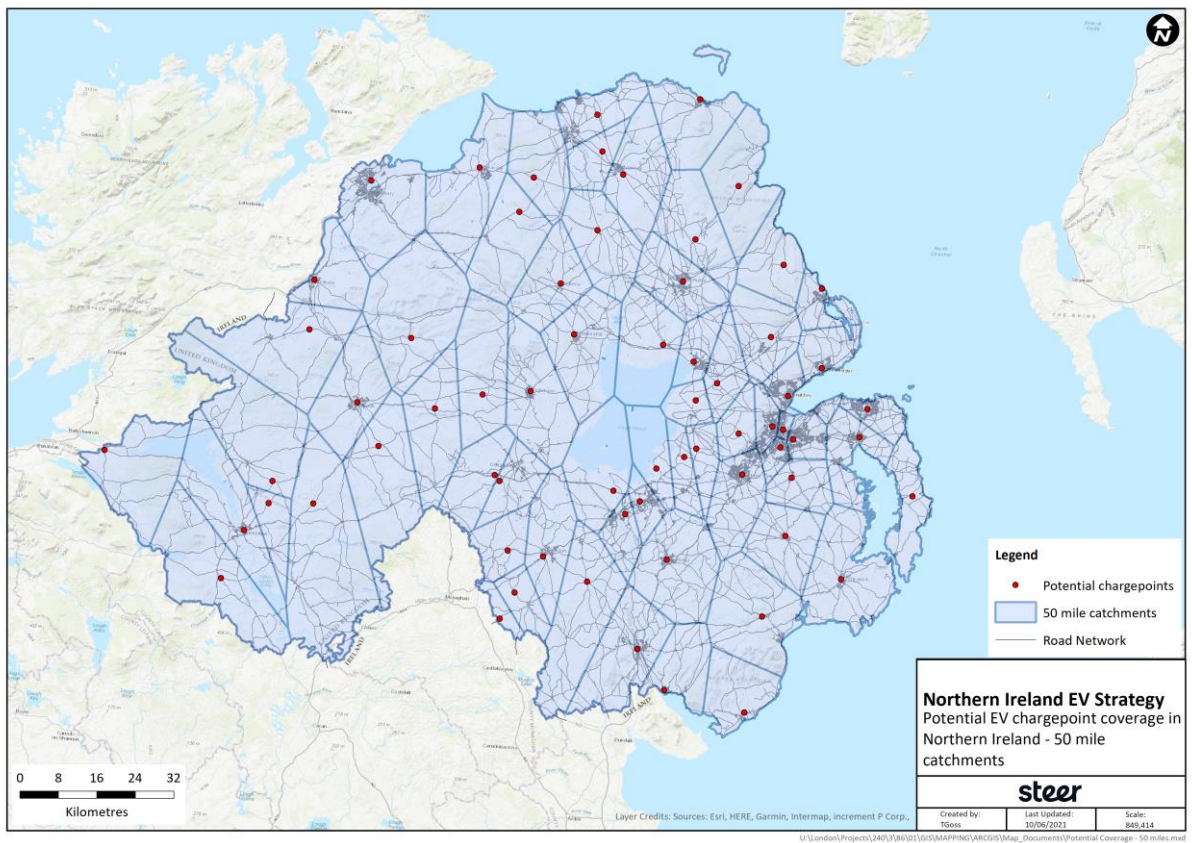


Figure 4-4: Potential EV Charge point coverage – 50 mile catchments

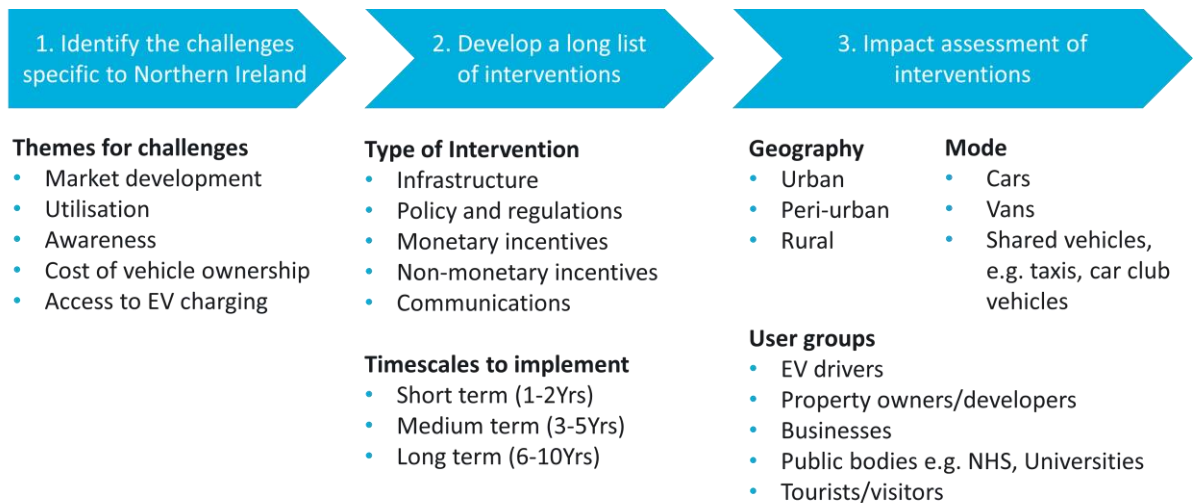


5 Options and recommendations

Overview

5.1 An assessment matrix was developed where a long list of around 50 potential challenges and opportunities for EVs in Northern Ireland were identified, and then measures to address them were mapped, including short(1-2 years), medium(3-5 years) and long(6-10 years) term measures. The matrix also identified the different geography, user groups, and vehicle mode the measures would impact.

Figure 5-1: Options assessment matrix



5.2 Based on the initial findings, a workshop was conducted with key stakeholders at DfI to discuss and prioritise the key challenges and opportunities in Northern Ireland. These inputs were used to develop the recommended measures for short to medium (3-5 years) term.

5.3 This chapter provides a summary of key challenges and opportunities identified, and recommended measures to address them.

5.4 The long list of challenges and suggested measures has been provided to the DfI as a separate attachment to this study.

Challenges and opportunities

5.5 From the assessment matrix we have established five broad themes that require government interventions to help develop the EV market in Northern Ireland, which include the following:

- Market development
- Utilisation
- Awareness
- Cost of vehicle ownership
- Access to EV charging

5.6 The key challenges and opportunities identified under each area (at the workshop) is included in Table 5-1 below.

Table 5-1: Summary of key challenges/opportunities

Areas of development	Challenges	Opportunities
Market development	<ul style="list-style-type: none"> Commercial viability of developing EV public charging network Lack of funding/ limited access and inclusion into UK Charging infrastructure government funding Limited experience and resources at local authority level to deliver EV projects 	<ul style="list-style-type: none"> Availability of wider EV models – with better range and affordable prices Larger commitment from vehicle manufacturers on improving battery technology
Utilisation	<ul style="list-style-type: none"> Reliability of public charging Upgrade of existing network Grid capacity and connection costs 	<ul style="list-style-type: none"> EV Charging technology improvements – super chargers, wireless charging, etc.
Awareness	<ul style="list-style-type: none"> Lack of public knowledge about EV running costs (as compared to ICE vehicles) Anxiety about using an EV 	<ul style="list-style-type: none"> Increasing consumer confidence in EVs
Cost of vehicle ownership	<ul style="list-style-type: none"> Higher initial purchase costs compared to ICE vehicles Socioeconomic factors 	<ul style="list-style-type: none"> Declining EV costs, with advances in battery technology
Access to EV charging	<ul style="list-style-type: none"> Lack of access to driveway for home charging, e.g., 60% of households have no access to driveway in Belfast Lack of access to charging on public car parks/ workplace charging Need to develop a network of fast charging in highways to facilitate long distance/ cross-border travel 	<ul style="list-style-type: none"> Majority of population living in rural areas with access to home charging Potential for private operators to set up rapid charge points/ EV charging hubs

Recommended measures

5.7 We have included below our recommended measures and interventions that can be introduced as part of the EV development strategy. We have focused on the short to medium term measures that prepare the environment for the market growth in EVs expected, including how these can be delivered.

Setting up a Northern Ireland specific Zero Emission Vehicles Taskforce

5.8 Similar to Low Emission Vehicle Taskforce in Ireland, which was formed in December 2016, we recommend Northern Ireland to set up a Zero Emission Vehicle (ZEV) Taskforce to develop, implement, review, and monitor the measures available to Northern Ireland to accelerate the uptake of zero carbon technologies in the road transport sector.

Structure

5.9 The ZEV taskforce will be an interdepartmental body chaired by Department for Infrastructure with representatives from across the public sector, ZEV manufacturers, infrastructure companies, user representative groups and other stakeholders.

5.10 The main objectives of the ZEV taskforce will include:

- Helping Northern Ireland meet its climate change objectives and achieve its Net Zero target;
- Engage in and support research and innovation projects that support the net zero targets in collaboration with public and private bodies;
- Developing regulations and policy measures suitable to provide an ecosystem that encourages private participation in EV infrastructure development; and
- Understanding and evaluating the local needs of users and based on which targeted policies and measures will be devised and implemented.

Roles and responsibilities

5.11 ZEV taskforce will play a central role in developing and delivering on the ZEV strategy. It will initially focus on developing the EV market, which shall eventually expand to cover all other zero-emission capable vehicles such as hydrogen fuels. The four main responsibilities of the ZEV taskforce will include:

- Improving visibility and public awareness of ZEVs;
- Reviewing existing monetary and non-monetary incentives and introducing additional incentives to stimulate user uptake;
- Facilitating infrastructure and market development; and
- Developing policies and regulations, including planning legislations, building regulations that will widely support ZEV deployment.

5.12 We have listed below the key measures and interventions that we would suggest for deployment in the short to medium term by the newly set up ZEV taskforce which address the four key responsibility areas identified above.

1. Visibility and public awareness of ZEVs

5.13 Developing public awareness of EVs is one of the key enablers to increasing EV uptake, particularly in rural areas where anxiety about EV maintenance costs and usage is more prevalent. A number of programs can be introduced to improve public awareness which may include educating users on the long-term benefits of using EVs (in terms of maintenance costs), relieve range anxiety (with sharing knowledge about newer models), and environmental benefits.

Measures

5.14 Some of the key measures/schemes we will recommend for the next 3 to 5 years, as was introduced by the Irish government in 2017-2020 and several other governments across Europe and globally, include:

- A national public awareness campaign to raise the profile and understanding of EVs;
- A public driver experience roadshow to provide people across the country with the opportunity to drive an EV and better understand their benefits;
- Public sector and commercial fleet trials allowing public bodies and businesses to trial EVs (both cars and small vans); and
- Potential supports for car sharing schemes providing the opportunity for non-EV owners to use EVs on short trips.

- 5.15 Outreach programs may also be directed at educating users on the current EV purchase incentives (OLEV grant, home charging) available to them. This may include fleet operators too.

Impacts of the measures

- 5.16 These schemes will primarily help boost sales of EV private vehicles (including passenger cars and light vans <3.5m) and have higher impacts in rural or peri-urban areas which currently have lower EV share in registered vehicles (Figure 1-1).

Role of ZEV taskforce/government

- 5.17 These programs will be led at local authority level, with guidelines and timescales provided by the national ZEV task force.
- 5.18 ZEV taskforce will also be responsible for obtaining and allocating funding for these programs and based on which will formulate the timescales for the programs, and work with local authorities on delivering the programs.
- 5.19 The costs to deliver these types of programs largely depend on the scale and timescales of the programs. Some potential costs can be shared with the EV manufacturers who might be willing to participate in the awareness schemes to increase the sale of their vehicles. It is recommended, therefore, that all relevant stakeholders are consulted prior to launching the schemes.

2. Monetary and non-monetary incentives

- 5.20 There are several OLEV grants and purchase incentives available to the users as provided by the UK government (**Chapter 3**). However, given the low uptake of EVs across Northern Ireland, compared to national average, additional measures can be introduced to drive EV uptake. These measures can be introduced in short term.

Measures

- 5.21 Some of the additional measures that can be considered by the ZEV taskforce include:
- Monetary measures
 - Advocate for UK tax breaks, such as Benefit-in-kind, motor tax relief, or VAT refund
 - Additional purchase grants and/or home charging grants, workplace charging grants (e.g., Scotland)
 - Non-monetary measures
 - A parking incentive including discounted or free parking for EVs (in urban areas)
 - EV access to bus lanes or other shared vehicle lanes to avoid traffic (in urban areas)

Impact of measures

- 5.22 The monetary measures will help stimulate EV uptake in areas where there is relatively high underlying demand, and already have a range of EV models available. They will not only help stimulate the passenger car market but can also be targeted to increase EV uptake amongst fleet operators, and company vehicles.
- 5.23 The non-monetary measures should be targeted at urban areas e.g., Belfast where parking and traffic congestion is an ongoing challenge, and these incentives can help user transition to EVs quickly.

Role of ZEV taskforce/government

- 5.24 ZEV taskforce should consider the feasibility of introducing these measures prior to launching the schemes. These should include a series of stakeholder consultations with local authorities and public, evaluating the policy fit, potential benefits to costs ratio, and delivery mechanisms.
- 5.25 We recommend that the timescales for these measures should be limited to a couple of years only, when the EV penetration is still very low, as these may encourage non-car users to purchase and use EVs which is not desirable in long-term owing to related congestion issues.

3. Infrastructure and market development

- 5.26 Considering the landscape of the Northern Ireland market; a mainly rural location where access to a private driveway is 80%, four major urban conurbations, and a series of interconnecting roads both in and out of the Republic of Ireland.
- 5.27 On this basis, it is recommended to focus on the measures that could be considered key enablers to EV take up that are informed by the landscape of the NI market first.

Measures

- 5.28 The key measures considered that address the landscape include:
- Greater provision of charging (on-street and destination) in urban areas where access to a driveway (60% of households in Belfast do not have access to a driveway³⁰) is limited therefore a home charger incentive would be limited in take up.
 - UK Funding is available to local authorities to support on-street residential schemes (GULCS) as well as workplace charging schemes that can be utilised by private companies to further facilitate charging infrastructure growth.
 - Establishing a network of rapid charging across NI strategic highways and corridors, connecting the major urban areas.
 - This requires the development of an overarching strategy and target to support coverage of the country. The DFI (EV task force) in collaboration with stakeholders would seek to further refine the numbers required and potential locations. While it would be envisioned that this network would be delivered through private funds. The DFI along with the Department for the Economy should seek to review how they can enable the environment to encourage engagement in the market. An example of this would be that of mainland UK, the funding received for ‘Project Rapid’ will be primarily focused on enabling works such as land, grid upgrades and infrastructure. In the example of NI implementation, a similar approach with negotiating long term contracts with private operators, particularly rapid charge point operators, while land and enabling grid infrastructure is provided by the local authorities could potentially help develop the charging network in Northern Ireland.
 - Ensuring the network links into NI from Ireland are connected with a consistent service when crossing the border. With consideration to how Light Commercial Vehicle freight might be provided for.
 - Addressing the issues with the current network deployed within NI.
 - It has been previously noted that the current network, which was established as part of the Plugged-In Places scheme and now over 10 years old has become unreliable and hardware updates becoming an issue due to now obsolete parts and technology.

³⁰ NI Census 2011 – based on Dwellings, Household Spaces and Accommodation Type

- We would suggest in conjunction with the current operator a review of the network is required. The plan should review:
 - The current location of the charging stations and the user case to determine the level of upgrade required e.g., replacement like for like speed or upgrade to a high-power charger,
 - The utilisation of the charger in situ,
 - The supporting grid structure to support any upgrades (linked to Rapid charging corridor development program)

Impact of measures

- 5.29 The combined implementation of the measures proposed will not greatly impact EV uptake in the short-term, rather the medium-term, as all require a level of combined planning in order to set up the environment and establish funding mechanisms. However, the short-term actions to review and set plans in place (if communicated well) will give users greater confidence in their decision to purchase or use an EV.
- 5.30 The Republic of Ireland provides in addition to a similar package of incentives (vehicle price, home charging schemes) as series of incentives to uses including tax relief and a reduction on toll costs for drivers. This year Ireland is also allocating £27million to an overall program of subsidies including those mentioned. The funding is part of an overall £36.5 million pot that has been earmarked for decarbonising transport this year. According to the Society of the Irish Motor Industry (SIMI)³¹ the EV market has continued to grow with new EV sales total year to date (May 2021) 3,952 versus 1,847 (2020) an increase of 114%. It can be inferred that these types of stimulation packages that address infrastructure and consumer buyers directly do encourage the uptake of EVs in the market.

Role of ZEV taskforce/government

- 5.31 The role of the ZEV taskforce or DfI will be to review and ascertain funding routes in order to bring together similar stimulation packages that can be offered or supplement the wider UK incentive packages on offer. The UK EV monetary incentives to consumers were reduced last year, given that Northern Ireland is not yet a market as developed as England, this reduction would seem detrimental to the uptake in EVs in Northern Ireland at such an early stage in the country's adoption.

4. Policy interventions and regulations

- 5.32 A number of policy and regulatory changes can be introduced to support long term transition to ZEVs and set on a path of Zero-emission strategy and sustainable growth. The regulations will consider the following areas:
- Public vehicle procurement regulations
 - Building regulations
 - Planning legislations, etc.
- 5.33 This will help Northern Ireland to adopt a policy outlook that supports and encourages sustainable and zero-emission living.

³¹ <https://www.simi.ie/en/news/may-new-vehicle-registrations-encouraging>

Measures

5.34 The key measures include the following:

- Standards to procure EVs for public vehicle fleet, though share of public fleet in total vehicle fleet is low and will have negligible impact on meeting environmental goals, this will help NI set an example that it is committed to transitioning to EVs and will also act as an ambassador tool to promote EVs amongst citizens. In launching the Road to Zero Strategy the UK Government set out a commitment to make all central government cars electric by 2030, but at least 25% by 2022. At the time Chris Grayling said “We want the UK to be the best place in the world to own an EV, and as a government we have to lead by example.
- Changes to building regulations and planning requirements where EV charging provision is mandated in new developments and/or buildings under major renovation. For e.g., mandate installation of at least 1 EV charging point for every 10 parking spaces.

Impact of measures

5.35 The impact of deploying standards within the public fleet is twofold. Internally there is likely to be a total cost of ownership reduction that the department will benefit from. Deploying EVs on a fleet that employees can utilise is also a low risk opportunity for users to try and become familiar with the technology and charging experience in order that they can act as advocates for the transition. To the external audience it shows commitment to the decarbonisation plan and leading by example. Initial cost to implement will depend on the size and financing of the fleet. Initial EV purchase prices may be high, and the installation of charging hardware will be required however, the running and maintenance cost associated with running an EV will be lower than that of the current ICE fleet.

5.36 Creating planning conditions to support the provision of charging infrastructure as part of any new or significantly updated developments at an early stage not only supports the future growth of EVs but is also a far more cost effective and optimised solution than implementing retrofit actions to provision for charging. The impact of the measure will be seen in the medium to long term timeframe supporting EV uptake in a period where transitioning to electric is becoming the norm. The cost to implement the requirement is considered low, as the work required is administrative in its requirement to deliver.

Role of ZEV taskforce/government

5.37 The DfI would play a leading role in bringing together the stakeholders from other governmental departments in order to support the development of policies so that they are in alignment and complimentary with the wider charging infrastructure strategy to be deployed.

5.38 The role of ZEV taskforce/DfI will be to develop EV infrastructure strategy that includes the following:

- Recommendations and guidelines for local authorities to update their Development plans which include provision is made for EV charging, particularly in new development and construction;
- Guidelines for planning authorities on development and rollout of a consistent and future proof EV infrastructure across Northern Ireland, e.g.:
 - How to procure and construct public charge points, charging hubs, or lamp-column charging, where possible;

- How to retrofit on-street parking/public car park payment machines with provision for EV charging payments (where EV charging is available).

Appendices

A International good practice review

Country profiles

Norway	
Current EV landscape	
Uptake of EVs	<ul style="list-style-type: none"> Norway is the first country in the world to have a majority of new car sales be electric: <ul style="list-style-type: none"> – Full year 2020: 54% BEVs³² – March 2021: 56% BEVs³³
EV infrastructure provision	<ul style="list-style-type: none"> In 2020 Norway had 17 BEVs per public charge point³⁴. As of January 2021, there is enough charging infrastructure so that 330,000 EVs can fast charge simultaneously³⁵. Norway homes over 9% of all charging stations in Europe, despite only making up 0.7% of the European population³⁶.
Policy and Regulations	
EV targets	<ul style="list-style-type: none"> Norway National Transport Plan (2018-2029): <ul style="list-style-type: none"> – All new light vehicles, city buses and light commercial vehicles should be zero-emission by 2025 – All new heavy commercial vehicles should be zero-emission by 2030, as will 75% of new long distance buses and 50% of new lorries
Key policies and initiatives	<ul style="list-style-type: none"> Transnova/Enova: <ul style="list-style-type: none"> – Transnova program launched in 2009, led by the Norwegian Public Roads Administration. – Funding program for environmental projects that aim to speed up the uptake of alternative fuels (including electricity) and advancing solutions within the transport sector. – Program still exists, but under the name Enova.

³² [Norway becomes first country where EVs outsell combustion cars | Autocar](#)

³³ [Norway registers 84.8% market share of plug-in cars in March - electrive.com](#)

³⁴ [Alternative fuels \(electricity\) charging infra stats | EAFO](#)

³⁵ [Norwegian EV policy | Norsk elbilforening](#)

³⁶ https://blog.wallbox.com/en/norway-ev-incentives/#index_0

Norway										
Funding and investment	<ul style="list-style-type: none"> In 2017 the Enova launched a program to finance at least two multi-standard fast charging stations every 50km on all main roads in the country, funding of €5.3 million. This has been successfully established. Norway has the world's largest Sovereign Wealth Fund relative to its population size (\$1tn for a population of just over 5 million), this is very advantageous as the Norwegian government doesn't face budget constraints typically faced by many other countries. 									
Incentives										
Monetary incentives	<ul style="list-style-type: none"> Various tax incentives and subsidies that have distorted the market to make EVs and ICE vehicles price comparable, for example see the table below comparing electric and petrol VW Golf prices³⁷: <table border="1"> <thead> <tr> <th></th> <th>VW Golf Petrol</th> <th>VW E- Golf</th> </tr> </thead> <tbody> <tr> <th>Germany</th> <td>€19,520</td> <td>€35,900</td> </tr> <tr> <th>Norway</th> <td>€33,420</td> <td>€34,580</td> </tr> </tbody> </table> <ul style="list-style-type: none"> 'The polluter pays' tax system, high emission cars pay high taxes and low or zero emission cars pay low taxes. VAT exemption for zero-emission vehicles that has been approved to the end of 2022.³⁸ 		VW Golf Petrol	VW E- Golf	Germany	€19,520	€35,900	Norway	€33,420	€34,580
	VW Golf Petrol	VW E- Golf								
Germany	€19,520	€35,900								
Norway	€33,420	€34,580								
Infrastructure incentives	<ul style="list-style-type: none"> Oslo has an Electric Vehicle Supply Equipment (EVSE) grant³⁹: <ul style="list-style-type: none"> Covers a maximum of 20% of the cost of EVSE purchase and installation Up to €450 per charging point and up to €91,000 per housing association. Skedsmo also has an Electric Vehicle Supply Equipment (EVSE) grant⁴⁰: <ul style="list-style-type: none"> Covers a maximum of 20% of the cost of EVSE purchase and installation and professional consultation Up to €450 per charging point and up to €23,000 per housing association. Asker Electric Vehicle Supply Equipment (EVSE) grant⁴¹: <ul style="list-style-type: none"> Covers a maximum of 50% of the cost of EVSE purchase and installation Up to €450 per charging point and up to €4,500 per housing association. 									
Other non-monetary incentives	<ul style="list-style-type: none"> In Oslo, EV charging was free up to the beginning of 2019. Various municipal policies that support EV free parking and allowed EVs to use bus lanes. Whilst since 2017, municipal authorities have had power over whether they want to offer EV incentives in relation to parking and bus lanes, Parliament 									

³⁷ [Why Norway leads the charge on electric vehicles | foundry4](#)

³⁸ [Norwegian EV policy | Norsk elbilforening](#)

³⁹ https://blog.wallbox.com/en/norway-ev-incentives/#index_0

⁴⁰ https://blog.wallbox.com/en/norway-ev-incentives/#index_0

⁴¹ https://blog.wallbox.com/en/norway-ev-incentives/#index_0

Norway	
	<p>does have a 50% mandate meaning that local governments can't charge more than 50% of the price of ICE vehicles on ferries, toll roads and for parking.⁴²</p> <ul style="list-style-type: none"> • Asker offer free charging, users only pay for the cost of parking⁴³.
EV infrastructure	
Current number of charge points	<ul style="list-style-type: none"> • In 2020 Norway had around 13,500 normal public charge points and just over 5,000 fast public charge points.⁴⁴
Provision and management	<ul style="list-style-type: none"> • Transova/Enova stand as PPP support programmes: <ul style="list-style-type: none"> – Offer of coverage up to 30,000 NOK per charge point, also support fast charging stations. • Oslo municipality⁴⁵: <ul style="list-style-type: none"> – Has had their own charge point programme. – Charge points are established and managed by Oslo municipality. Example includes the municipality leasing a floor in a shopping centre, only to be used to charge EVs. – Also target cooperatives, condominiums, and commercial partners, and offers up to 10,000 NOK per charge point. – In this set up the charge point can be publicly available or reserved for the organisation, but the recipient of the funding must manage the charge point for 5 years.
Main charge point operators	<ul style="list-style-type: none"> • Mer (formerly Grønn Kontakt) has over 260 fast charging stations across Norway and is continuing to expand⁴⁶. • Fortum Charge & Drive has over 2,400 chargers and over 150,000 customers in Norway⁴⁷.
Charge pricing/payment	<ul style="list-style-type: none"> • Mer pricing (offers an RFID chip to use for charging, or you can pay by app)⁴⁸: <ul style="list-style-type: none"> – Fast/superfast charging registered customer: NOK 1.25 per minute + NOK 3.20 per kWh – Fast/superfast charging drop-in customer: NOK 2.50 per minute + NOK 3.50 per kWh – Normal charging registered customer: NOK 0.10 per minute + NOK 2.90 per kWh – Normal charging drop-in customer: NOK 0.30 per minute + NOK 2.90 per kWh • Tesla Supercharger pricing: <ul style="list-style-type: none"> – Due to such high demand leading to queuing in Norway, Tesla are piloting a scheme that reduces supercharging station prices by 50% on certain days to encourage owners to travel on quieter days.

⁴² [Norwegian EV policy | Norsk elbilforening](#)

⁴³ https://blog.wallbox.com/en/norway-ev-incentives/#index_0

⁴⁴ [Alternative fuels \(electricity\) charging infra stats | EAFO](#)

⁴⁵ [NO Electric-Vehicles-Initiative_SkovKristensenLaugeThomassenJakobsen.pdf \(jiip.eu\)](#)

⁴⁶ <https://no.mer.eco/english/>

⁴⁷ <https://www.fortum.com/about-us/newsroom/press-kits/country-fact-sheets/fortum-norway>

⁴⁸ <https://no.mer.eco/english/>

Norway

Role of charging aggregator

- Electric Car Association charging chip: Norwegian Electric Car Association (Elbilforengens) gives users access to charging units across the country at a reduced price.
- Charge and Drive chip: free charging chip from energy company Fortum, can use it to charge at almost every charging in the country.

Germany	
Current EV landscape	
Uptake of EVs	<ul style="list-style-type: none"> Sales of full EVs tripled in 2020 with 194,163 EVs sold⁴⁹. EVs make up 1.2% of all registered passenger cars in Germany.
EV infrastructure provision	<ul style="list-style-type: none"> In May 2020 Germany had 27,730 charging spots (increase of nearly 60% from previous year). Fast charging is around 14% share of this.⁵⁰ In 2020 Norway had 7 BEVs per public charge point⁵¹.
Policy and Regulations	
EV targets	<p>2030 Climate Action Programme:</p> <ul style="list-style-type: none"> Target of 1 million charge points by 2030. Target of 7-10 million registered EVs by 2030.
Key policies and initiatives	<p>Charging Infrastructure Master Plan (2019):</p> <ul style="list-style-type: none"> Aims to establish of 50,000 public charge points by the end of 2022 <p>The Electromobility Act (EmoG) (2015)⁵²:</p> <ul style="list-style-type: none"> Legislation to specifically support towards the spread of electromobility in Germany. Under this legislation subsidies were introduced in 2016 for the purchase of EVs and plug-in hybrids. EmoG is implemented to varying extents across federal states and municipalities.
Funding and investment	<p>2020 German Stimulus Package⁵³:</p> <ul style="list-style-type: none"> Plans to spend €2.5 billion on EV charging infrastructure, battery cell production and R&D. Plans also suggest that plan implies that Germany plans to introduce a mandate to include EV charging stations at petrol stations. <p>Government has put in place a new 300 million euro charging incentive program (April 2021-December 2021):</p> <ul style="list-style-type: none"> Aimed at SMEs in the retail, hotel, and catering industry, as well as small municipal utilities and local authorities. <p>Sozial & Mobil Fleet Exchange Programme⁵⁴:</p> <ul style="list-style-type: none"> allocated fund of 200 million euros which will be used to promote electric mobility in urban traffic and non-profit organisations.

⁴⁹ <https://europe.autonews.com/automakers/german-electric-car-sales-triple-2020#:~:text=Electrified%20vehicles%20with%20full%20or,roads%20by%202030%2C%20Damm%20said.>

⁵⁰ <https://europe.autonews.com/automakers/german-public-electric-car-charging-network-grows-60>

⁵¹ [Alternative fuels \(electricity\) charging infra stats | EAFO](#)

⁵² <https://www.adac.de/rund-ums-fahrzeug/elektromobilitaet/info/vorteile-elektroauto-stadt/#:~:text=Fahrzeuge%20mit%20E%2DKennzeichen%20d%C3%BCrfen,sogar%20unbegrenzt%20und%20ohne%20Parkscheibe.>

⁵³ [https://www.thestreet.com/tesla/news/germany-increases-ev-incentives-2020#:~:text=The%20two%20biggest%20changes%20are,%2Dadded%20tax%20\(VAT\).&text=Beginning%20July%201st%2C%20VAT%20will,to%20ICE%20vehicles%20as%20well.](https://www.thestreet.com/tesla/news/germany-increases-ev-incentives-2020#:~:text=The%20two%20biggest%20changes%20are,%2Dadded%20tax%20(VAT).&text=Beginning%20July%201st%2C%20VAT%20will,to%20ICE%20vehicles%20as%20well.)

⁵⁴ <https://blog.wallbox.com/en/the-ultimate-guide-to-ev-incentives-in-germany/>

Germany

Funding Directive for Charging Infrastructure for Electric Vehicles (Förderrichtlinie Ladeinfrastruktur für Elektrofahrzeuge)⁵⁵:

- German government provided €300m between 2017 and 2020.
- Aim of directive was to set up at least 15,000 charging stations by the end of 2020.

BMU (Federal Ministry of the Environment, Nature Conservation and Nuclear Safety)⁵⁶:

- Since 2018 the BMU has been promoting the procurement of electric buses for local public transport.
- Over €600m are available from the Energy and Climate Fund for this purpose.
- The purchase of more than 5 electric buses is subsidized with up to 80 percent of the additional investment costs.

Negotiations have been made between the government and the automotive industry players, government contributes to half of the monetary EV incentives and the automotive industry the other half.⁵⁷

Incentives

Monetary incentives

- Environmental bonus subsidies on EV purchase between June 2020 and December 2021, up to €9000 available (temporary increased amount due to COVID stimulus package)⁵⁸:

Type	Price bands	Federal share (doubled)	Manufacturer share (doubled)	Total subsidy
Electric car	<€40,000	€6000	€3000	€9000
Electric car	€40,000 - €65,000	€5000	€2500	€7500
Plug in hybrid	<€40,000	€4500	€2250	€6750
Plug in hybrid	€40,000 - €65,000	€3750	€1875	€5625

- Kfz Steuer (ownership tax) – 10 years tax exemption for full EVs (for all fully electric vehicles registered between 2011 and 2030 (saving of around €194 per car per year on average)⁵⁹.
- Local incentives of up to €1,500 for the purchase of an EV (depends on state and city of residence). Note that local incentives are on top of the national incentives.

⁵⁵ <https://www.wfw.com/articles/the-future-of-e-charging-infrastructure-germany/>

⁵⁶ <https://www.bmu.de/themen/luft-laerm-verkehr/verkehr/elektromobilitaet/foerderung/>

⁵⁷ <https://electrek.co/2020/06/04/germany-boost-ev-incentives-9000-euros-helping-tesla-model-3-vw-id-3/>

⁵⁸ <https://www.adac.de/rund-ums-fahrzeug/elektromobilitaet/kaufen/foerderung-elektroautos/>

⁵⁹ <https://blog.wallbox.com/en/the-ultimate-guide-to-ev-incentives-in-germany/>

Germany	
Infrastructure incentives ⁶⁰	<ul style="list-style-type: none"> • KW-Bank (German state-owned development bank): €900 incentive per charging point for the purchase and installation of an EV charger • Local incentives from federal states and cities: up to €3,500 on the purchase and installation of an EV charger • For SMEs, the government has put in place a new 300 million euro incentive program (April 2021-December 2021)⁶¹: <ul style="list-style-type: none"> – One of the prerequisites of the grant is the use of renewable energy for powering the charging stations. – The subsidy covers up to 80% of the total costs for purchase and installation. – Up to €4,000 per AC/DC charger of 3,7 to 22 kW. – Up to €16,000 per DC fast chargers of 22 to 50 kW. – Up to €10,000 for low voltage and up to €100,000 for medium voltage grid connections. • Local incentives from energy providers: up to €400 on the purchase and installation of an EV charger • Tax free charging of private or company EVs at work.
Other non-monetary incentives	<p>2015 Electromobility law (Elektromobilitätsgesetz)⁶², different specific implementations in different states/cities but has given EV drivers privileges in relation to:</p> <ul style="list-style-type: none"> • Free parking • Reserved parking spots • Bus lane use <p>Examples include⁶³:</p> <ul style="list-style-type: none"> • Munich: until end of 2020 EVs could park free for 2 hours in all areas managed by the city • Berlin: EVs can park free at charging stations whilst being charged • Dusseldorf: have created two 'environmental lanes', in which buses, bicycles, taxis and EVs have privileged driving.
EV infrastructure	
Current number of charge points	<ul style="list-style-type: none"> • In 2020 Germany had just over 37,000 normal public charge points and almost 7,500 fast public charge points.⁶⁴
Provision and management	National Centre for Charging Infrastructure (NOW GmbH) together with the Federal Ministry of Transport, BMVI ⁶⁵ :

⁶⁰ <https://blog.wallbox.com/en/the-ultimate-guide-to-ev-incentives-in-germany/>

⁶¹ <https://blog.wallbox.com/en/the-ultimate-guide-to-ev-incentives-in-germany/#NationalPublicEVChargingIncentives>

⁶² <https://blog.wallbox.com/en/the-ultimate-guide-to-ev-incentives-in-germany/>

⁶³ <https://www.adac.de/rund-ums-fahrzeug/elektromobilitaet/info/vorteile-elektroauto-stadt/#:~:text=Fahrzeuge%20mit%20E%2DKennzeichen%20d%C3%BCrfen,sogar%20unbegrenzt%20und%20ohne%20Parkscheibe.>

⁶⁴ [Alternative fuels \(electricity\) charging infra stats | EAFO](#)

⁶⁵ <https://www.electrive.com/2020/06/18/1000-dc-charging-sites-now-the-german-government-is-building-superchargers/>

Germany	
	<ul style="list-style-type: none"> • Inviting tenders for the construction and operation of what will be the country's largest rapid charging network • Previously just offered subsidies/funding to incentivise purchase and installation of charge points but realised this wasn't enough to entice enough operators. • The government has now agreed to close the medium or long term profitability gap of the operators. • In this tender, the companies will remain the operators, but will sign a contract with the government that defines quality standards and deadlines. • The tender is organised in parts, which group more attractive and less attractive locations. • Tender participants (the Charge Point Operators) enter a 'lottery' draw and must provide non-discriminatory access to all e-mobility providers (EMP) and ad hoc chargers on equal terms.
Main charge point operators	<ul style="list-style-type: none"> • Utilities operate 80% of Germany's public charging stations⁶⁶. • The key charge point operators in Germany are: <ul style="list-style-type: none"> – Ionity – Total – Innogy – Digital Charging Solutions (DCS or ChargeNow) PlugSurfing
Charge pricing/payment	<ul style="list-style-type: none"> • As of April 2019, tariff structures based purely on charging time are not allowed. Prices for electricity must be based on kWh. Time based parking fees on top of a fee per kWh are still allowed⁶⁷. • The Energy Industry Act (Energiewirtschaftsgesetz – EnWG) states that charging station operators be treated as the final consumers. This means that operators as final consumers must pay grid fees but are not subject to the regulatory duties of grid operators.⁶⁸
Role of charging aggregator	<ul style="list-style-type: none"> • Berlin provides a uniform charging card that grants access to all charging points in public areas independent of the charging operator.⁶⁹ • In Hamburg, the electricity suppliers have established a framework contract with distribution network operators to guarantee user-friendly access to the public charging infrastructure network.⁷⁰

⁶⁶ <https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/111720-german-ev-chargers-up-19-to-33000-as-utilityauto-lobbies-differ-over-rollout>

⁶⁷ <https://www.wfw.com/articles/the-future-of-e-charging-infrastructure-germany/>

⁶⁸ <https://www.wfw.com/articles/the-future-of-e-charging-infrastructure-germany/>

⁶⁹ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](https://www.theicct.org/analyzing-policies-to-grow-the-electric-vehicle-market-in-european-cities)

⁷⁰ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](https://www.theicct.org/analyzing-policies-to-grow-the-electric-vehicle-market-in-european-cities)

Netherlands	
Current EV landscape	
Uptake of EVs	<ul style="list-style-type: none"> In 2020, 21% of all newly registered cars were battery electric vehicles, and 4% plug in hybrid vehicles.⁷¹ The Dutch Government has estimated an average of 400,000 new EVs on the roads per year by 2030.⁷²
EV fleet characteristics	<ul style="list-style-type: none"> In 2020, 73% of all new electric passenger cars in the Netherlands were registered by companies versus 27% by private individuals.⁷³
EV infrastructure provision	<ul style="list-style-type: none"> The Netherlands has the highest number of public charging points per EVs and per 100km² in Europe.⁷⁴ 4 PEV's per public charging point (best ratio in Europe).⁷⁵ A network of fast-charging stations is being rolled out along Dutch highways. Many regional governments, cities, and companies now provide EV fast chargers in parking lots
Policy and Regulations	
EV targets	<ul style="list-style-type: none"> All new passenger cars sold from 2030 to be zero-emission.⁷⁶ From 2030 onwards it is planned for Amsterdam to only allow zero-emission vehicles into the city centre.⁷⁷ Amsterdam has a qualitative target of becoming a leader in the e-mobility field.
Key policies and initiatives	<ul style="list-style-type: none"> The National Charging Infrastructure Agenda – part of the 2019 Dutch Climate Agreement. It is based on 5 pillars⁷⁸: <ol style="list-style-type: none"> A network with high coverage of charging infrastructure Strategic & data driven placement of public charging infrastructure Accessible information such as location and availability of charging point and charge rates. A good balance for types of charging infrastructure for all modalities. Future-proof charging infrastructure and smart charging to prevent capacity overload on the electricity grid.

⁷¹ [Small but mighty: The Netherlands' leading role in electric vehicle adoption | International Council on Clean Transportation \(theicct.org\)](#)

⁷² [Everything You Need To Know About EV Incentives In The Netherlands - EVOLVE \(wallbox.com\)](#)

⁷³ [Small but mighty: The Netherlands' leading role in electric vehicle adoption | International Council on Clean Transportation \(theicct.org\)](#)

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⁷⁵ [Alternative fuels \(electricity\) charging infra stats | EAFO](#)

⁷⁶ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](#)

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⁷⁸ [The National Charging Infrastructure Agenda \(rvo.nl\)](#)

Netherlands												
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Funding and investment	<ul style="list-style-type: none"> Green Deal framework - Publicly Accessible Electric Charging Infrastructure: <ul style="list-style-type: none"> Mid-2015 to July 2018, budget of €7.2 million. Funded by the Dutch government (Ministry of Economic Affairs and Infrastructure, Ministry of Water Management), beneficiaries were the local and regional governments. June 2019 National Agreement: <ul style="list-style-type: none"> Budget of €250 million to stimulate electric driving. This is the total budget available until 2025. Subsidy scheme (€4,000 for new EVs, €2,000 for used EVs)⁸⁰: <ul style="list-style-type: none"> Budget for the subsidy scheme was €17.2 million in 2020, €10 million was for new cars and the rest for used cars. Scheme running until 2025, annual budget set on a yearly basis. 											
Incentives												
Monetary incentives ⁸¹	<ul style="list-style-type: none"> The Vehicle Purchase Subsidy Scheme is managed by the Netherlands Enterprise Agency (RNO). Below are the subsidies available for vehicles that cost €45,000 and under, and have a range of at least 120km⁸²: <table border="1"> <thead> <tr> <th>Year</th> <th>New</th> <th>Used</th> </tr> </thead> <tbody> <tr> <td>2020 and 2021</td> <td>€ 4,000</td> <td>€ 2,000</td> </tr> <tr> <td>2022</td> <td>€ 3,700</td> <td>€ 2,000</td> </tr> </tbody> </table> 	Year	New	Used	2020 and 2021	€ 4,000	€ 2,000	2022	€ 3,700	€ 2,000		
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⁷⁹ [Everything You Need To Know About EV Incentives In The Netherlands - EVOLVE \(wallbox.com\)](#)

⁸⁰ <https://www.electrive.com/2020/03/05/the-netherlands-goes-for-ev-purchase-subsidies/>

⁸¹ [Everything You Need To Know About EV Incentives In The Netherlands - EVOLVE \(wallbox.com\)](#)

⁸² <https://zoek.officielebekendmakingen.nl/stcrt-2020-28162.html>

Netherlands

2023	€ 3,350	€ 2,000
2024	€ 2,950	€ 2,000
2025	€ 2,550	€ 2,000

- No VAT on BEV purchases (cost saving of around 1/6th).
- Taxes are waived or reduced significantly for EVs (see details below), whereas ICE vehicles are charged particularly high taxes in comparison to other European countries.
- Purchase tax for EVs (Belasting van personenauto's en motorrijwielen; BPM):
 - Until 2024: fully exempt from purchase tax
 - 2025: pay a purchase tax fee of €360 per car
 - After 2025: purchase tax fee will increase with inflation every year
- Motor Vehicle Tax (MRB), an annual tax you pay on the possession of a car, motorcycle, or truck:
 - Until 2024: fully exempt from motor vehicle tax
 - 2025: 75% discount on MRB
 - 2026 onwards: full MRB applies
- Bijtelling (this is a type of tax that applies if you use the company car privately, and the car is an EV). Tax rate for EV company cars are shown below, the rate is 22% for ICE cars:

Year	Bijtelling tax rate
2020	8%
2021	12%
2022-25	16%

- Companies that promote electric driving don't have to pay the 21% VAT (business tax relief scheme).
- Environmental Investment Allowance (MIA): Using the MIA, companies can receive an investment deduction of up to 36% of the amount invested into the EV.

Infrastructure incentives

- National subsidies for the installation of charging infrastructure.
- In metropolitan areas such as Amsterdam or Rotterdam-The Hague, companies and individuals could request a public charging station to be installed (free of charge) if they had no possibility to charge at home or at their workplace – flexible response to charging demand.⁸³
- Environmental Investment Allowance (MIA)⁸⁴:
 - Using the MIA, companies can receive an investment deduction of up to 36% of the amount invested into a charging point.
- Random Depreciation of Environmental Investments (VAMIL)⁸⁵:
 - VAMIL offers companies the possibility to depreciate 75% of the investment costs of a charging point.

⁸³ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](https://theicct.org)

⁸⁴ [Everything You Need To Know About EV Incentives In The Netherlands - EVOLVE \(wallbox.com\)](https://wallbox.com)

⁸⁵ [Everything You Need To Know About EV Incentives In The Netherlands - EVOLVE \(wallbox.com\)](https://wallbox.com)

Netherlands	
Other non-monetary incentives	<ul style="list-style-type: none"> In Amsterdam, residents and companies owning an electric vehicle were given priority on the waiting list for parking permits.⁸⁶ In Rotterdam, electric taxis are allowed to use certain bus lanes.⁸⁷
EV infrastructure	
Current number of charge points	<ul style="list-style-type: none"> In 2020 the Netherlands had around 64,000 normal public charge points and just under 2,500 fast public charge points⁸⁸
Provision and management	<ul style="list-style-type: none"> The Netherlands heavily relies on PPPs to establish and grow their local charging network. Cities have been increasingly collaborating, by working together in regional concessions for public charging infrastructure. This approach has enabled new public charging infrastructure to be rolled out with little or no additional government investment.⁸⁹ National Charging Infrastructure Knowledge Platform Foundation (NKL)⁹⁰: <ul style="list-style-type: none"> Goal of lowering the cost of public charging infrastructure for all stakeholders, by encouraging shared projects. Rings together the distribution system operator, charge point operator and the municipality.
Main charge point operators	<ul style="list-style-type: none"> Total: <ul style="list-style-type: none"> Won Europe's largest concession contract for public electric vehicle charging (involves installation and operation of 20,000 new public electric vehicle charging points) from Metropolitan Region Amsterdam Electric (MRA-Electric). Total already has 4,500 public charging points in the Netherlands (acquired when they acquired Dutch company PitPoint in 2017). Total will now become the main EV charging operator in the MRA-Electric region. Fastned (operates network of over 100 charging stations in the Netherlands) Allego has around 90 charging stations covering most of the Netherlands New Motion has been bought by Shell Recharge, they aim to open 200 fast chargers over 2020/2021 (150 kWh), which will be operated by Allego⁹¹.
Charge pricing/payment	<ul style="list-style-type: none"> Payment for EV charging is based on energy consumption. Fastned charging is priced at €0.59 per kWh, but charge card providers can apply adjusted prices, for example if you are paying through BMW Chargenow you will pay a transaction fee of €2.50 + €0.35 per kWh at a Fastned station⁹².

⁸⁶ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](https://theicct.org)

⁸⁷ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](https://theicct.org)

⁸⁸ [Alternative fuels \(electricity\) charging infra stats | EAFO](https://www.eafo.org)

⁸⁹ [The National Charging Infrastructure Agenda \(rvo.nl\)](https://www.rvo.nl)

⁹⁰ [Nederland Elektrisch - Charging infrastructure](https://www.nederlandelektrisch.nl)

⁹¹ <https://www.linkedin.com/pulse/essential-guide-cheap-fastcharging-netherlands-kishan-tsang>

⁹² <https://www.linkedin.com/pulse/essential-guide-cheap-fastcharging-netherlands-kishan-tsang>

Netherlands	
	<ul style="list-style-type: none">• Tesla supercharging is a lot cheaper in the Netherlands compared to other European countries, varying between €0.22 – 0.26 per kWh depending on location and time. In Germany it is €0.33, in France it's €0.36.⁹³
Role of charging aggregator	<ul style="list-style-type: none">• The Netherlands is a leader in charging payment system interoperability.• Charging an electric vehicle can be done with one single card at all public charging points in the Netherlands⁹⁴.

⁹³ [Tesla increases charging costs of Tesla Superchargers by 15 to 20% - Netherlands News Live](#)

⁹⁴ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](#)

France	
Current EV landscape	
Uptake of EVs	<ul style="list-style-type: none"> Overall, in 2020, the BEV share of new auto registrations was 6.7% and for PHEVs 4.5%, resulting in a cumulative 2020 plug-in share of 11.2%.⁹⁵
EV infrastructure provision	<ul style="list-style-type: none"> Most small towns and large villages have public EV charge points.
Policy and Regulations	
EV targets	<ul style="list-style-type: none"> French target of banning new ICE sales by 2040.⁹⁶ France has set a goal of 1 million electric vehicles on the road by 2022. From 2030 onwards it is planned for Paris to only allow zero-emission vehicles into the city centre.⁹⁷ Aims of the have all 440 of the service areas on the national road network being equipped with fast charging stations by end of 2022.⁹⁸ Government target announced in October 2020: aim to have 100,000 public charging points in operation by the end of 2021.⁹⁹
Key policies and initiatives	<ul style="list-style-type: none"> France adopted a national decree in 2016 that requires parking spaces in new building developments to be fitted with recharging points (50% or 75% of the parking spaces depending on the absolute number of parking spaces).¹⁰⁰
Funding and investment	<ul style="list-style-type: none"> COVID-19 rescue plan for the country's auto industry¹⁰¹: <ul style="list-style-type: none"> €8 billion package, €1.3 billion of which is set aside for EV incentives. March 2021 - The French Government has announced that it is launching a €100 million funding programme to support the installation of fast charging stations for electric cars¹⁰²: <ul style="list-style-type: none"> Companies that want to install charging hubs on the national road network and public motorways will be able to benefit from this funding. To be eligible, there must be a plan to install at least four fast charging station, including two 150 kW stations. Financing of these stations is planned to be at a rate of 30% on average. Funding can be combined with the existing Mobility Orientation Act – covers 75% of connection costs to the electricity grid.

⁹⁵ [France Hits Record 19.2% EV Share In December — Up Almost 6x Year On Year \(cleantechnica.com\)](#)

⁹⁶ [Official: Government to ban new petrol and diesel car sales in 2030 | Autocar](#)

⁹⁷ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](#)

⁹⁸ [France launches €100 million funding programme for electric vehicle fast charging | Eltis](#)

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¹⁰⁰ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](#)

¹⁰¹ [France's new \\$13,000 EV incentive is the most generous in Europe \(autonews.com\)](#)

¹⁰² [France launches €100 million funding programme for electric vehicle fast charging | Eltis](#)

France	
	<ul style="list-style-type: none"> – Funding aims to result in all 440 of the service areas on the national road network being equipped with fast charging stations by end of 2022.
Incentives	
Monetary incentives	<ul style="list-style-type: none"> • Increased subsidies as part of 2020 automotive industry restructuring plan¹⁰³: <ul style="list-style-type: none"> – Up to €12,000 temporarily available as French car owners could receive a bonus of €5,000 euros for scrapping an older diesel car (€3,000 for ICE), and also access the €7,000 grant towards buying a new electric vehicle. – Subsidies towards EVs only apply to vehicles costing less than €45,000. • 2020 level of subsidies (outlined above) was temporary, reductions in the future¹⁰⁴: <ul style="list-style-type: none"> – BEV subsidy will be reduced to €5,000 in 2022. – Special subsidy for company fleets will be cut to €1,000 for 2021 and 2022, currently support is at €5,000. – But there is a separate initiative to support low income households in switching to EVs, which remains at €3,000 across 2021 and 2022. • France has a bonus malus scheme, known as “malus écologique”¹⁰⁵: <ul style="list-style-type: none"> – It is an environmental tax that applies to vehicles with a certain level of CO2 emissions and is payable upon registration. – Plans for the thresholds of CO2 emissions to become more strict year on year (2020: €1,000 for vehicles that emit between 138-140 grams of CO2 per kilometre, in 2021 the band for the same registration €1,000 tax is reduced to an upper limit of 131 grams, 2022 will be further reduced to an upper limit of 123 grams). • Low emission zone bonus: <ul style="list-style-type: none"> – €1,000 subsidy for the purchase of an EV if you live or work in a low emission zone and have received a similar incentive from your local authority
Infrastructure incentives	<ul style="list-style-type: none"> • Government Advenir funding program¹⁰⁶: <ul style="list-style-type: none"> – Been in place since 2016. – Companies and public entities can receive up to 40% of the costs for the supply and installation of a charging point to a maximum of €1,860. • In Paris, housing collectives and taxi companies could receive a 50% aid for the installation of the charging infrastructure in 2018¹⁰⁷. • €300 tax credit (crédit d’impôt transition énergétique; CITE) on the purchase and installation of an EV charger at your main residence¹⁰⁸.

¹⁰³ [France's new \\$13,000 EV incentive is the most generous in Europe \(autonews.com\)](#)

¹⁰⁴ [France decreases electric vehicle subsidies as sales rise - electrive.com](#)

¹⁰⁵ [France decreases electric vehicle subsidies as sales rise - electrive.com](#)

¹⁰⁶ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](#)

¹⁰⁷ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](#)

¹⁰⁸ <https://blog.wallbox.com/en/france-ev-incentives/>

France	
Other non-monetary incentives	<ul style="list-style-type: none"> • With a green card (for which EV owners are eligible), some municipalities offer up to 2 hours of free parking.¹⁰⁹ • Paris offers designated free parking for EVs.
EV infrastructure	
Current number of charge points	<ul style="list-style-type: none"> • In 2020 France had 42,000 normal public charge points and around 3,750 fast public charge points.¹¹⁰
Provision and management	<ul style="list-style-type: none"> • The development of charging infrastructure has largely been led by a series of public private partnerships.
Main charge point operators	<ul style="list-style-type: none"> • Izivia (formerly Sodetrel, owned by EDF) dominates the market. They operate the Corri-Door charger network. • New Motion • Freshmile • Virta • KiWhi • GIREVE
Charge pricing/payment	<ul style="list-style-type: none"> • Paris offers a flat rate for charging at €120 per year for individual and professional users. This rate is increased to €600 for professionals operating the vehicle commercially, for example for carsharing or vehicle-for-hire operators and taxi companies.¹¹¹ • Elsewhere in France, it is one of the only European countries where you are billed by for charging time, not kWh or power of the charging station.¹¹² <ul style="list-style-type: none"> – Typically charged in 15 minute increments or pay as you go contracts. You can find anything from a 0.50 euro package for 5 minutes of charging, to 4 euros for 15 minutes, or even 5 euros for a 45-minute charge. – Without a subscription, prices can be much higher. • Over 100 Auchan supermarkets have fast EV charge points that are free to use.
Role of charging aggregator ¹¹³	<ul style="list-style-type: none"> • The most common apps/cards for charging are from Izivia (EDF) or KiWhi passes, but OEMs also have their own versions. Non card holders of Izivia are still granted access to their 'Corri-Door' motorway charger network. • KiWhi technology has been bought by Nissan who have created the Zero Emission Charge Pass, a kind of Nissan branded KiWhi pass given to all Nissan EV customers.

¹⁰⁹ [Country detail incentives | EAFO](#)

¹¹⁰ [Alternative fuels \(electricity\) charging infra stats | EAFO](#)

¹¹¹ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](#)

¹¹² [The cost of charging an electric car - Easy Electric Life \(renault.com\)](#)

¹¹³ [On Charge: Where to Charge Your Electric Rental Car in France > Europcar Edito COM](#)

United States													
Current EV landscape													
Uptake of EVs	<ul style="list-style-type: none"> Fully electric vehicle registration reached a market share high of 1.8% in 2020. EV market share has triple in 3 years. Has 1.77 million EVs in the overall car fleet (2nd largest in the world after China). There are differences by region, EV car sales market share in 2020: <ul style="list-style-type: none"> Western region: 4.8% (San Francisco DMA is highest at 11%) Northeast region: 1.6% (driven by a 2% share of NYC DMA) Southeast region: 1.1% (led by Washington D.C. at 2.5%) Southwest region: 0.9% (led by Austin at 2.1% EV market share) Midwest region: 0.8% (Chicago led at 1.5% market share) 												
EV fleet characteristics	<ul style="list-style-type: none"> Tesla continues to dominate the U.S. electric vehicle market with an estimated 290,000 electric vehicles sold in the United States in 2020¹¹⁴. 												
EV infrastructure provision	<ul style="list-style-type: none"> US has 67 EVs per charging station¹¹⁵ In the 50 most populated metropolitan areas, ~14% of public chargers are DC fast, ~86% are Level 2.¹¹⁶ 												
Policy and Regulations													
EV targets	<ul style="list-style-type: none"> Biden has set a goal of the government fleet of 650,000 vehicles being replaced with fully electric models, along with the national network of 500,000 school buses to be electric by 2030¹¹⁷. There are further targets implemented on a state-by-state basis, for example: <ul style="list-style-type: none"> California executive order September 2020: all vehicle sold in the states by 2035 will be zero-emission vehicles.¹¹⁸ Targets are also set out on a city-by-city basis, for example¹¹⁹: <table border="1" data-bbox="491 1137 1331 1516"> <thead> <tr> <th>City</th> <th>Goal</th> <th>Strategy</th> </tr> </thead> <tbody> <tr> <td>Houston</td> <td>30% of new vehicle sales to be EVs by 2030</td> <td>Evolve Houston electric vehicle roadmap</td> </tr> <tr> <td>Seattle</td> <td>30% of car ownership be EVs by 2030</td> <td>Drive Clean Seattle Implementation Strategy</td> </tr> <tr> <td>Los Angeles</td> <td>25% of total registrations be zero-emission vehicles by 2025, 80% by 2035 and 100% by 2050.</td> <td>L.A.'s Green New Deal</td> </tr> </tbody> </table> 	City	Goal	Strategy	Houston	30% of new vehicle sales to be EVs by 2030	Evolve Houston electric vehicle roadmap	Seattle	30% of car ownership be EVs by 2030	Drive Clean Seattle Implementation Strategy	Los Angeles	25% of total registrations be zero-emission vehicles by 2025, 80% by 2035 and 100% by 2050.	L.A.'s Green New Deal
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¹¹⁴ [The U.S. electric vehicle industry - statistics & facts | Statista](#)

¹¹⁵ [United States Ranks 10th In EV Adoption Study, Netherlands Tops List \(insideevs.com\)](#)

¹¹⁶ [Update on electric vehicle adoption across U.S. cities \(theicct.org\)](#)

¹¹⁷ <https://insideevs.com/news/490166/united-states-ranks-10th-ev-adoption-study/>

¹¹⁸ [Electric vehicle transition in the U.S. is nearing a tipping point | Canada's National Observer: News & Analysis](#)

¹¹⁹ [Update on electric vehicle adoption across U.S. cities \(theicct.org\)](#)

United States	
	Deploy 10,000 public chargers by 2022, and 28,000 by 2028.
Key policies and initiatives	<ul style="list-style-type: none"> • Biden administration has also announced measures to accelerate EV adoption, including a plan to roll out 500,000 new public charging stations across the US by 2030. This is more than 5 fold the number of charging stations currently existing in the country.¹²⁰ • Various state-by-state and city-by-city policies and initiatives, many cities and states have developed their own electric vehicle roadmap (e.g. San Francisco, Houston, Portland, Colorado).¹²¹
Funding and investment	<ul style="list-style-type: none"> • President Biden’s plan to deploy 500,000 chargers (5 fold increase in existing infrastructure) will cost over \$5 billion, will provide roughly 57% of the country’s charging needs by 2030.¹²² • President Biden has promised \$400 billion in public investment in clean energy, including battery technologies and electric vehicles.¹²³ • The California Energy Commission’s Clean Transportation Program invests up to \$100 million annually, using public and private investments to promote the development of clean, efficient, low-carbon technologies to reduce greenhouse gas emissions and petroleum dependence.¹²⁴ • In May 2018, the California Public Utilities Commission (CPUC) approved funding of \$22.4 million to go to PG&E, who would install infrastructure that supports Direct Current Fast Charging for electric vehicles. The installations will take place over 2020-2025, supporting the expansion of public fast-charging stations for light vehicles.¹²⁵
Incentives	
Despite some national legislation, most incentives are decided and implemented on a state-by-state basis. 45 states provide some form of incentive for EVs, either through a specific utility operating in the state or through state legislation. ¹²⁶	
Monetary incentives	<ul style="list-style-type: none"> • The federal government currently offers up to \$7,500 in tax credits for consumers who purchase an electric plug-in vehicle. But each automaker has a threshold of selling up to 200,000 units, then a wind down period for the

¹²⁰ [President Biden Wants To Roll Out 500K New EV Chargers: Is It Possible? \(insideevs.com\)](https://insideevs.com/news/30000/ev-charging/500k-new-ev-chargers-possible/)

¹²¹ [Update on electric vehicle adoption across U.S. cities \(theicct.org\)](https://theicct.org/2018/05/01/update-on-electric-vehicle-adoption-across-u-s-cities/)

¹²² [President Biden Wants To Roll Out 500K New EV Chargers: Is It Possible? \(insideevs.com\)](https://insideevs.com/news/30000/ev-charging/500k-new-ev-chargers-possible/)

¹²³ [Auto industry wants more government support for electric vehicles \(cnbc.com\)](https://www.cnbc.com/2018/05/01/auto-industry-wants-more-government-support-for-electric-vehicles.html)

¹²⁴ <https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/clean-transportation-program-investment>

¹²⁵ [PG&E EV Fast Charge Program \(pge.com\)](https://www.pge.com/en/energy/ev/ev-fast-charge-program)

¹²⁶ <https://www.ncsl.org/research/energy/state-electric-vehicle-incentives-state-chart.aspx>

United States	
	<p>user purchase incentive is initiated. Only Tesla and General Motors have hit that threshold.¹²⁷</p> <ul style="list-style-type: none"> • Further incentives are organised at a state level. The incentive offering of states varies significantly:¹²⁸ <ul style="list-style-type: none"> – Many states offering rebates at the time of vehicle purchase (for example Connecticut, New York, and Pennsylvania). – Several states apply tax exemptions or credits instead of rebates, for example, Colorado and Louisiana apply an income tax credit, Maryland issues an excise tax credit, and Washington State uses an exemption in sales tax.
Infrastructure incentives	<ul style="list-style-type: none"> • Alternative Fuel Vehicle (AFV) Refueling Property Credit from the government Internal Revenue Service (IRS) gives US businesses and residents access to 30% off their entire EV charging hardware purchase (up to \$30,000). This federal tax credit also extends back to purchases made in 2018-21. This initiative end at the end of 2021.¹²⁹ • Once again, there are also varying incentives available at the state level, for example: <ul style="list-style-type: none"> – Arizona: Tucson Electric Power (TEP) residential customers are eligible for a rebate to cover up to 75% of the cost of installing EVSE, with maximum rebate amounts capped at \$500 for a two-way charger and \$250 for a one-way charger. TEP also offers a 5% decrease in applicable charges for residential users who charge their EV during off-peak hours¹³⁰. – California: PG&E's EV Fast Charge Program covers the costs (funded by California Public Utilities Commission) and manages construction of electrical infrastructure necessary to install DC fast chargers. The program also offers a rebate of up to \$25,000 per charger for those sites located in disadvantaged communities.¹³¹
Other non-monetary incentives	<ul style="list-style-type: none"> • There are various other incentives offered in states and cities. • High vehicle occupancy lanes (HOV or carpool lane) access and advantageous parking policies benefit EV drivers in California and Arizona, as well as in Atlanta, Nashville, Raleigh, and Salt Lake City.¹³²
EV infrastructure	

¹²⁷ [Auto industry wants more government support for electric vehicles \(cnbc.com\)](https://www.cnn.com/2019/01/08/autos/electric-vehicle-incentives/index.html)

¹²⁸ [Update on electric vehicle adoption across U.S. cities \(theicct.org\)](https://theicct.org/publications/2019/04/24/update-on-electric-vehicle-adoption-across-u-s-cities/)

¹²⁹ <https://www.evbox.com/us-en/learn/rebates/federal-tax-credit-30>

¹³⁰ <https://www.ncsl.org/research/energy/state-electric-vehicle-incentives-state-chart.aspx>

¹³¹ [PG&E EV Fast Charge Program \(pge.com\)](https://www.pge.com/en/energy/ev/ev-fast-charge-program)

¹³² [Update on electric vehicle adoption across U.S. cities \(theicct.org\)](https://theicct.org/publications/2019/04/24/update-on-electric-vehicle-adoption-across-u-s-cities/)

United States	
Current number of charge points	<ul style="list-style-type: none"> The US currently has around 90,000 individual public EV chargers.¹³³
Main charge point operators	<ul style="list-style-type: none"> Tesla¹³⁴: <ul style="list-style-type: none"> Dominates the market, with both their destination charger and their supercharger offering. The next largest charging network is just 10% of the size of the Tesla network. Electrify America¹³⁵: <ul style="list-style-type: none"> 2nd largest network after Tesla. Have just under 600 charging stations across the US, with 2,500 high speed DC fast chargers. They have had rapid growth since they opened their first station in 2018, opening on average 4 stations a week ever since. Plans to have installed/have in development 800 total charging stations, with 3,500 DC Fast Chargers by the end of 2021. EVGo¹³⁶: <ul style="list-style-type: none"> Also, a key fast charger provider in the US. They have partnered with General Motors. GM and EVgo have announced plans to add more than 2,700 new fast chargers over the next five years. ChargePoint: <ul style="list-style-type: none"> Offers both slow charging and fast charging, at public locations such as shopping centres. Greenlots
Charge pricing/payment	<ul style="list-style-type: none"> Tesla¹³⁷: <ul style="list-style-type: none"> Pricing varies by location, where possible users are billed per kWh, however in some locations billing is by minute. Certain supercharger locations offer peak and off-peak rates. Billed either at Tier 1 or Tier 2, depending on the charging speed (Tier 1 is when charge speed is under 60kWh, it is half the price of Tier 2). Tesla Destination chargers are free to use by all Tesla drivers who are customers of the locations where the charger is located, these are typically chargers of 22kWh¹³⁸. Electrify America¹³⁹:

¹³³ [President Biden Wants To Roll Out 500K New EV Chargers: Is It Possible? \(insideevs.com\)](https://insideevs.com/news/502565/electrify-america-canada-free-charging-earth-day/)

¹³⁴ <https://hbr.org/2021/01/how-teslas-charging-stations-left-other-manufacturers-in-the-dust>

¹³⁵ <https://insideevs.com/news/502565/electrify-america-canada-free-charging-earth-day/>

¹³⁶ [Tesla Supercharger Network Vs Electrify America Vs EVgo \(Late 2020\) \(forbes.com\)](https://www.forbes.com/sites/kevinthompson/2020/12/15/tesla-supercharger-network-vs-electrify-america-vs-evgo-late-2020/)

¹³⁷ <https://www.tesla.com/support/supercharging?redirect=no>

¹³⁸ [Tesla Network - charging guide & cost \(zap-map.com\)](https://www.zap-map.com/tesla-network-charging-guide-cost/)

¹³⁹ <https://www.electrifyamerica.com/pricing/>

United States

- Payment is per kWh or per minute dependent on location, where possible they have tried to offer per kWh pricing.
- Idle fee of \$0.40/min if you stay over 10 mins after your car is finished charging.
- With a subscription (around \$4 a month), you have a cheaper per kWh rate.

United Kingdom																																													
Current EV landscape																																													
Uptake of EVs	<ul style="list-style-type: none"> The UK EV market is growing very quickly, there over 235,000 pure-electric cars on UK roads at the end of March 2021.¹⁴⁰ 2019-2020 there was growth of 66% in EV registrations.¹⁴¹ The growth of EV uptake, in terms of cumulative EVs registered in the UK can be seen in the chart below (from Green Car):¹⁴² <p>Cumulative number of plug-in vehicles registered in the UK (2012 to date)</p> <table border="1"> <caption>Cumulative number of plug-in vehicles registered in the UK (2012 to date)</caption> <thead> <tr> <th>Year</th> <th>PHEV</th> <th>BEV</th> <th>Total</th> </tr> </thead> <tbody> <tr><td>2012</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>2013</td><td>~10,000</td><td>~10,000</td><td>~20,000</td></tr> <tr><td>2014</td><td>~20,000</td><td>~20,000</td><td>~40,000</td></tr> <tr><td>2015</td><td>~40,000</td><td>~40,000</td><td>~80,000</td></tr> <tr><td>2016</td><td>~70,000</td><td>~70,000</td><td>~140,000</td></tr> <tr><td>2017</td><td>~110,000</td><td>~110,000</td><td>~220,000</td></tr> <tr><td>2018</td><td>~160,000</td><td>~160,000</td><td>~320,000</td></tr> <tr><td>2019</td><td>~210,000</td><td>~210,000</td><td>~420,000</td></tr> <tr><td>2020</td><td>~260,000</td><td>~260,000</td><td>~520,000</td></tr> <tr><td>2021 (YTD)</td><td>~260,000</td><td>~240,000</td><td>~500,000</td></tr> </tbody> </table> <p>Source: SMMT, OLEV, DfT Statistics. Updated: March 2021</p> <p>next greencar™</p>	Year	PHEV	BEV	Total	2012	0	0	0	2013	~10,000	~10,000	~20,000	2014	~20,000	~20,000	~40,000	2015	~40,000	~40,000	~80,000	2016	~70,000	~70,000	~140,000	2017	~110,000	~110,000	~220,000	2018	~160,000	~160,000	~320,000	2019	~210,000	~210,000	~420,000	2020	~260,000	~260,000	~520,000	2021 (YTD)	~260,000	~240,000	~500,000
Year	PHEV	BEV	Total																																										
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2021 (YTD)	~260,000	~240,000	~500,000																																										
EV infrastructure provision	<ul style="list-style-type: none"> The UK has 13 plug-in electric vehicles per public charge point.¹⁴³ Between the end of 2016 and 2020 there has been an increase of 220% in the number of public chargers.¹⁴⁴ Public charge points are not evenly distributed across the UK, with progress in rural areas being limited. Northern Ireland has 327 public charge points (only 1.4% of UK market).¹⁴⁵ 																																												
Policy and Regulations																																													
EV targets	<ul style="list-style-type: none"> Plan to ban all sales of new ICE vehicles and most hybrids by 2030 (in 2020 target was brought forward from 2040 to 2030). Applies to vans and cars.¹⁴⁶ 																																												

¹⁴⁰ [Electric vehicle market statistics 2021 - How many electric cars in UK ? \(nextgreencar.com\)](#)

¹⁴¹ [Electric vehicle market statistics 2021 - How many electric cars in UK ? \(nextgreencar.com\)](#)

¹⁴² [Electric vehicle market statistics 2021 - How many electric cars in UK ? \(nextgreencar.com\)](#)

¹⁴³ [Alternative fuels \(electricity\) charging infra stats | EAFO](#)

¹⁴⁴ [How many charge points are there in the UK 2021 \(zap-map.com\)](#)

¹⁴⁵ [How many charge points are there in the UK 2021 \(zap-map.com\)](#)

¹⁴⁶ [Official: Government to ban new petrol and diesel car sales in 2030 | Autocar](#)

United Kingdom	
	<ul style="list-style-type: none"> • Government’s 2018 Road to Zero Strategy:¹⁴⁷ <ul style="list-style-type: none"> – Outlines how the government will support the transition to zero emission road transport and reduce emissions from conventional vehicles during the transition. – Ambitions have been increased since the launch of this strategy (e.g. ban of ICE sales has been brought forward to 2030 from 2040). • At the city level, London’s Parking Standards require 20% of parking spaces in residential developments for electric vehicles, as well as make-ready infrastructure for an additional 20% of parking spaces
Key policies and initiatives	<ul style="list-style-type: none"> • Go Ultra Low Cities Scheme¹⁴⁸: <ul style="list-style-type: none"> – £40 million made available for 2 to 4 cities to win through bidding process, aiming to cultivate uptake of EVs (4 year scheme, began in 2016). – Funding was awarded to London, Milton Keynes, Bristol and Nottinghamshire and Derby. – London was awarded £13 million to create ‘Neighbourhoods of the future’ prioritising ultra-low emission vehicles. – Milton Keynes received £9 million to open a city centre Electric Vehicle Experience Centre — a ‘one stop shop’ providing consumer advice and short-term vehicles loans – Bristol got £7 million to offer residents free residential parking for ULEVs, access to 3 carpool lanes in the city, over 80 rapid and fast chargers across the city and a scheme encouraging people to lease a plug-in car for up to 4 weeks to help them better understand the range of benefits that electric vehicles bring – Nottinghamshire and Derby received £6 million of funding to install 230 chargepoints and offer ULEV owners discount parking and access to over 13 miles of bus lanes along key routes across the city. – The scheme is also providing £5 million of development funding for specific initiatives in Dundee, Oxford, York, and north east regions to help them play their part in kick-starting a country-wide clean motoring revolution. • Charge my Street¹⁴⁹: <ul style="list-style-type: none"> – It is a social enterprise set up to raise money for installing chargepoints in largely remote locations where there is little chance of receiving local authority or commercial intervention – Charge My Street is part of a broader project called Scaling On-Street Charging Infrastructure (SOSCI). It aims to install 200 fast chargers with a 22-kilowatt (kW) power rating for community use across the north of England by Easter 2021. – scheme has been backed with more than £3m in funding from Innovate UK • On-street Residential Chargepoint Scheme for Local Authorities¹⁵⁰:

¹⁴⁷ [CBP-7480.pdf](#)

¹⁴⁸ [£40 million to drive green car revolution across UK cities - GOV.UK \(www.gov.uk\)](#)

¹⁴⁹ [The case for building electric vehicle charging infrastructure in rural areas \(nsenergybusiness.com\)](#)

¹⁵⁰ [On-Street Residential Chargepoint Scheme guidance for local authorities - GOV.UK \(www.gov.uk\)](#)

United Kingdom	
	<ul style="list-style-type: none"> – The purpose of the scheme is to increase the availability of on-street chargepoints in residential streets where off-street parking is not available – Gives local authorities access to grant funding that can be used to part-fund the procurement and installation of on-street EV chargepoint infrastructure to residential needs. – Application process is open to all local authorities in the UK. – Project completion date has been extended to end of March 2023.
Funding and investment	<ul style="list-style-type: none"> • Government plans to invest over £2.8 billion in EVs, including a £1.3bn investment into accelerating the roll-out of EV charging points in homes, streets and on motorways across England.¹⁵¹ • The government has also allocated £582 million in grants to buyers of zero- or ultra-low-emissions vehicles.¹⁵² • In the November 2020 Spending Review, the government announced that it would invest £1.9 billion in charging infrastructure and consumer incentives, including¹⁵³: <ul style="list-style-type: none"> – £950 million to support the rollout of rapid electric vehicle charging hubs at every service station on England’s motorways and major A-roads – £582 million for the Plug-in Car, Van, Taxi, and Motorcycle Grant until 2022-23 – £275 million to extend support for charge point installation at homes, workplaces, and on-street locations – £90 million to fund local EV charging infrastructure to support the roll out of larger on-street charging schemes and rapid hubs in England • Highways England has a commitment of £15m to ensure there are chargepoints (rapid where possible) every 20 miles on 95% of the Strategic Road Network by 2020.¹⁵⁴ • On-street Residential Chargepoint Scheme for Local Authorities¹⁵⁵: <ul style="list-style-type: none"> – OZEV has allocated £20 million of funding in 2021 to 2022 for the scheme. The funding available is for 75% of the capital costs of procuring and installing the chargepoint and an associated dedicated parking bay.
Incentives	
Monetary incentives	<ul style="list-style-type: none"> • Plug in Car Grant: Grant of £2,500 for purchase of pure EV, on models up to £35,000, up to 30% off purchase price of vans.¹⁵⁶

¹⁵¹ [Official: Government to ban new petrol and diesel car sales in 2030 | Autocar](#)

¹⁵² [Official: Government to ban new petrol and diesel car sales in 2030 | Autocar](#)

¹⁵³ [CBP-7480.pdf](#)

¹⁵⁴ [CBP-7480.pdf](#)

¹⁵⁵ [On-Street Residential Chargepoint Scheme guidance for local authorities - GOV.UK \(www.gov.uk\)](#)

¹⁵⁶ [Electric vehicle costs - EV taxes and incentives UK 2021 \(zap-map.com\)](#)

United Kingdom		
	<ul style="list-style-type: none"> • Plug in Van Grant: cover 35% of the purchase price for small vans up to £3,000, and large vans up to £6,000.¹⁵⁷ • In London zero emission vehicles are exempt from congestion charges (although BEVs will be required to pay congestion charge from 2026).¹⁵⁸ • Pure electric vehicles do not have to pay Vehicle Excise Duty (road tax) until at least 2025.¹⁵⁹ • Businesses can claim 100% of the cost of an EV against the profits of the year of purchase with no restrictions on vehicle value.¹⁶⁰ 	
Infrastructure incentives	<ul style="list-style-type: none"> • Electric Vehicle Homecharge Scheme (OLEV)¹⁶¹: <ul style="list-style-type: none"> – 75% off installation of at home charging port (up to £500 per household) • Electric Vehicle Workplace Charging Scheme (OLEV)¹⁶²: <ul style="list-style-type: none"> – grant of £500 per ChargePoint, up to £10,000 per business • On-street Residential Chargepoint Scheme for Local Authorities (OZEV)¹⁶³: <ul style="list-style-type: none"> – The funding available is for 75% of the capital costs of procuring and installing the chargepoint and an associated dedicated parking bay – FY21-22 scheme - the maximum OZEV will fund per chargepoint unit has been increased to £13,000 to accommodate cases where connection costs are high. 	
Other non-monetary incentives	<ul style="list-style-type: none"> • No other national incentives, but there are some local authorities offering additional incentives, for example: <ul style="list-style-type: none"> – In London, Westminster Council provides free parking for ULEVs. 	
EV infrastructure		
Current number of charge points	Type	Number (as of April 2021) ¹⁶⁴
	Slow	5,556
	Fast	13,335
	Rapid	3,430
	Ultra Rapid	908
	Tesla Supercharger	679
	Total	23,249

¹⁵⁷ [Electric vehicle costs - EV taxes and incentives UK 2021 \(zap-map.com\)](#)

¹⁵⁸ [Analyzing policies to grow the electric vehicle market in European cities \(theicct.org\)](#)

¹⁵⁹ <https://www.saffery.com/news-and-events/publications/tax-benefits-of-electric-vehicles>

¹⁶⁰ <https://www.saffery.com/news-and-events/publications/tax-benefits-of-electric-vehicles>

¹⁶¹ [Grant schemes for electric vehicle charging infrastructure - GOV.UK \(www.gov.uk\)](#)

¹⁶² [Grant schemes for electric vehicle charging infrastructure - GOV.UK \(www.gov.uk\)](#)

¹⁶³ [On-Street Residential Chargepoint Scheme guidance for local authorities - GOV.UK \(www.gov.uk\)](#)

¹⁶⁴ [How many charge points are there in the UK 2021 \(zap-map.com\)](#)

United Kingdom							
Main charge point operators ¹⁶⁵	Rank	All			Rapid		
		Name	Number	Market Share	Name	Number	Market Share
	1	ubitrlicity	3,488	15.0%	Bp pulse	695	16.2%
	2	Pod Point	2,791	12.0%	Tesla Supercharger	679	15.8%
	3	Bp pulse	2,653	11.4%	Insta Volt	542	12.6%
	4	Charge Place Scotland	1,736	7.5%	Charge Place Scotland	397	9.2%
	5	Source London	1,527	6.6%	Genie Point	360	8.4%
	<ul style="list-style-type: none"> In Ireland the ESB (e-car network) is a key charge point operator. 						
Charge pricing/payment	<ul style="list-style-type: none"> In 2019, the UK government called for all new rapid chargers to incorporate contactless payment.¹⁶⁶ Tesla Destination charge points (typically 22kW)¹⁶⁷: <ul style="list-style-type: none"> Free to use as long as the EV owner is a customer of the destination in which the charge point is located. Tesla often installs non Tesla specific type 2 charge points next to its Destination chargers, so any EV driver (not just Tesla owners) can use, as with the Tesla Destination chargers these are free to use. BP Pulse¹⁶⁸: <ul style="list-style-type: none"> Offers a Polar Plus subscription that has a monthly fee but gives subscribers access to hundreds of free-to-use chargers, along with low rates of 12p/kWh for its fast and rapid chargepoints. Some operators will let you use their chargers for free during working hours, and IKEA stores will refund the Ecotricity charging cost if you spend in store. 						
Role of charging aggregator	<ul style="list-style-type: none"> Zap Pay: some networks have partnered with Zap-Pay, so Zap Map users can search for, plan, and pay for a charge point through the Zap Map app.¹⁶⁹ 						

¹⁶⁵ [How many charge points are there in the UK 2021 \(zap-map.com\)](https://zap-map.com)

¹⁶⁶ [Public charging networks - national and regional EV charging networks \(zap-map.com\)](https://zap-map.com)

¹⁶⁷ [Tesla Network - charging guide & cost \(zap-map.com\)](https://zap-map.com)

¹⁶⁸ [Electric car charging in the UK: prices, networks, charger types and top tips | Auto Express](https://www.autoexpress.com)

¹⁶⁹ [Public charging networks - national and regional EV charging networks \(zap-map.com\)](https://zap-map.com)

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