

# Electric vehicle potential within existing technical standards and commuting patterns

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## Abstract

The Climate Action Plan 2021 (CAP 2021) lays out plans for electrification of transport to reduce transport emissions in Ireland. Transitioning the passenger car fleet from Internal Combustion Engines (ICE) to Electric Vehicles (EV) is one such measure. However, there is broad scepticism about achieving ambitious targets related to transport due to low EV adoption rates. Fear of running out of power (range anxiety), lack of public charging infrastructure, and lack of awareness of existing EV technology are cited as some of the main reasons for the non-adoption of EVs. To investigate these concerns, we use data on commuting behaviour to identify candidates that could comfortably satisfy weekly driving needs using an EV without the need to alter behaviour for EV charging purposes. We identify hotspots of potential EV adopters in Ireland and quantify potential environmental gains from the adoption. We also study the coverage of the existing public charging network.

## Research Outcomes

From the sample of owners of more than one vehicle that report driving to work, 42% could switch one of their vehicles to an EV without range anxiety. However, the adoption rate falls to 8% if we consider only those with high incomes and levels of education (who are typically the early adopters of EVs). High density areas of potential adopters are found in cities such as Dublin, Cork, and Limerick. Some rural areas in Meath, Kilkenny, and Kerry also contain hotspots of potential EV adopters. We estimate that the direct emission reductions achieved by penetration of 8% and 42% of EV adopters are 7% and 37%, respectively. Emission reduction achieved by switching from a conventional vehicle to an EV will be higher in rural areas due to distances travelled, but the aggregate emissions reduction achieved in urban areas will be higher. We find that the existing charging infrastructure is well developed in Dublin city, and hence the areas identified in Dublin can be targeted

for a quicker transition. However, the charging infrastructure in rural areas and other cities needs further expansion to improve EV adoption.



## Recommendations

This research identifies geographical areas with a high density of potential adopters of EVs. Such information is beneficial for the targeted or localised promotion of EVs. Apart from high level marketing, other complementary actions such as local EV test drive centres could also be promoted for improving adoption rates. We find that charging infrastructure in urban areas is more developed compared to rural areas and hence the hotspots in urban areas can be targeted for a quicker transition to EVs.

Our estimates for the number of EVs potentially adopted indicate that the Irish Government's objective to increase EVs in Ireland to 180,000 by 2025 could be achievable. Existing incentives to overcome financial barriers include purchase grants, Vehicle Registration Tax (VRT) relief, toll incentives, home charger installation grants, and reduced motor tax rates. However, measures to raise adoption rates such as an increase in VRT rates or increases in fuel prices for conventional vehicles should be carefully designed because of potential distributional impacts. Combining EV adoption with modal shifts in transportation outlined in CAP 2021 such as increased access to cycling infrastructure and public transport would accelerate the decarbonisation of the sector. As per our analysis, the current charging infrastructure in Ireland can support a quicker transition to EVs and the expansion plans as per CAP 2021 should further improve access to public chargers.