

Exploring the Spatial Demand for Electric Vehicles in Scotland

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October 2015

Key Findings

- As of December 2014, 1344 Electric Vehicles (EV) have been registered in Scotland, representing 0.05% of the total car fleet
- Scotland ranks ahead of Wales and Northern Ireland in EV adoption
- Registrations of EVs in Scotland need to be 20016 per annum in 2020 and 134400 per annum in 2030 to achieve the Committee on Climate Change's desired emission mitigation scenario
- Significant spatial variation in EV registrations exists within Scotland:
 - Orkney Islands – 4.09 EVs per 1000 cars
 - West Dunbartonshire – 0.16 EVs per 1000 cars
- Relatively high levels of EV adoption correspond with:
 - High levels of installed EV charging infrastructure
 - High levels of university educated citizens

Introduction

The Scottish Government intends to achieve substantial greenhouse gas (GHG) emissions reductions by decarbonising Scotland's vehicle fleet. Electric Vehicles¹ (EVs) will be a key focus of this policy over the next 12 years and beyond, through Scottish Government support for EV infrastructure and the conversion of public sector vehicle fleets. The Committee on Climate Change (CCC) has developed GHG emissions mitigation scenarios for the United Kingdom's (UK) transport sector, highlighting milestones which will put the sector onto a trajectory appropriate to meeting the 80% reduction in GHG emissions by 2050². The CCC's scenarios indicate that 9% of all new vehicle sales in the UK will need to be EVs by 2020, increasing to 60% by 2030. Despite continuous sales expansion since their introduction to the mainstream market in 2011, EVs represented less than 1% of new car registrations in 2014.

To date, monitoring the sales of EVs has generally been conducted for the UK as a whole by evaluating the degree to which EV registrations are expanding. In this report, EV sales are spatially located in order to evaluate how EV registrations are occurring across the different geographical areas of the UK with specific attention paid to the current state of the EV market in Scotland. This analysis is made possible due to data released by the Department for Transport from their vehicle licensing statistics database³. To begin, a regional analysis is conducted to compare EV registrations across the different nation states which comprise the UK. Focus is then given to EV registrations within Scotland by examining the spatial variation which exists. To conclude, the areas within Scotland which currently exhibit high and low levels of EV registrations are evaluated in the light of other relevant characteristics. The findings of this study will be of value when monitoring developments in the early EV market and to consider how government policy can be tailored to local circumstances.

¹ Electric Vehicles (EVs) embody advancements in propulsion technology whereby the internal combustion engine of a conventional car is replaced by the combination of an electric motor powered by energy stored in an on-board battery pack.

² Committee on Climate Change – 2015 – Meeting Carbon Budgets – Progress in reducing the UK's emissions https://www.theccc.org.uk/wp-content/uploads/2015/06/6.737_CCC-BOOK_WEB_030715_RFS.pdf

³ Database information available at: <https://www.gov.uk/government/collections/vehicles-statistics>

Regional Analysis

Table 1 details the number of EVs which have been registered up to December 2014 across the nation states of the UK and regions of England. Additionally, the table notes the number of EVs registered per 1000 cars which are currently licensed in each state and region. Of the constituent nations of the UK, Scotland has so far observed registrations of EVs (per 1000 cars) which exceed registrations in Wales and Northern Ireland whilst England has experienced the highest levels of uptake. Currently, the number of EVs registered remains low, with EVs accounting for 0.07% of the UK's total licensed car fleet.

Table 1: Regional comparison of Electric Vehicle Registrations in the United Kingdom up to December 2014

Region	Electric Vehicles	Cars (thousands)	Electric Vehicles (per 1000 cars)
Scotland	1344	2369.3	0.567
England	19208	25216.2	0.762
North East	872	1075.0	0.811
North West	1350	3098.8	0.436
Yorkshire and Humber	1311	2304.5	0.569
East Midlands	1010	2271.2	0.445
West Midlands	3460	2867.8	1.206
East of England	2452	3182.4	0.770
London	2142	2588.4	0.828
South East	3802	4878.1	0.779
South West	2809	2950.0	0.952
Wales	517	1484.9	0.348
Northern Ireland	364	901.8	0.404
United Kingdom	21667	30513.3	0.710

In 2014, 222400 new cars were registered in Scotland⁴. If Scotland is to achieve the preferred GHG emissions reduction scenario set out by the CCC, and assuming that the total number of new car registrations in the future remain around current levels, EV registrations will need to be 20016 by 2020 (9% of new car registrations), increasing to 133440 (60% of new car registrations) by 2030. Putting the 2020 registration requirement into context of the numbers reported in Table 1, the EV market in Scotland will need to experience a compound annual growth rate of 57%, whilst the 2030 registration requirement will require a compound annual growth rate of 33% compared to the current cumulative level of registrations in order to achieve the CCC's emissions reduction trajectory.

⁴DfT – 2015 – Vehicle Licensing Statistics: Table VEH0254 <https://www.gov.uk/government/statistics/vehicle-licensing-statistics-2014>

Scotland Focus

Figure 1 illustrates the number of EVs registered up to December 2014 in each local authority of Scotland per 1000 existing car registrations. A significant degree of spatial variation in EV registrations is observed, with the Orkney Islands currently representing the local authority with the highest degree of EV registrations (4.09 EVs per 1000 cars) whilst West Dunbartonshire is the local authority with the fewest registered EVs (0.17 EVs per 1000 cars).

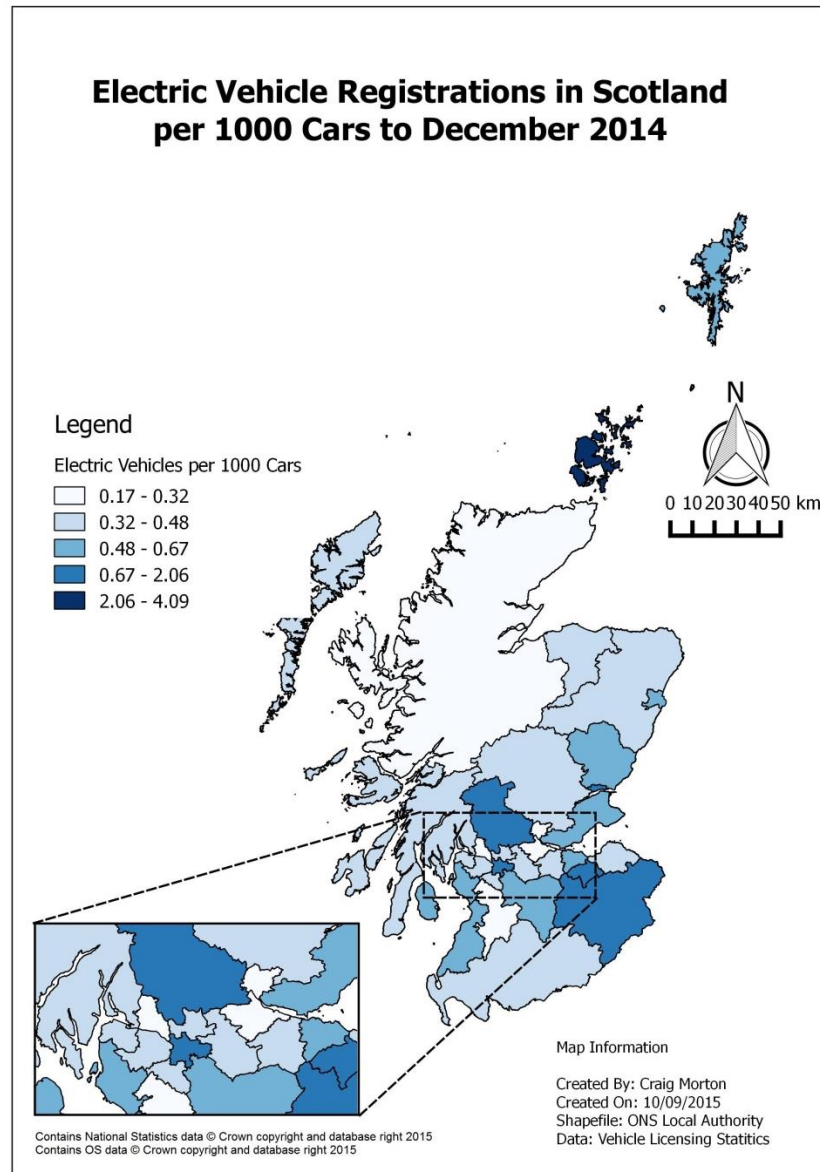


Figure 1: Choropleth Map of Electric Vehicle Registrations across the Local Authorities of Scotland

From a visual inspection of Figure 1, there is no obvious spatial organisation in the arrangement of EV sales across Scotland. For instance, there are no visible groupings of local authorities in Scotland which seem to cluster around high or low levels of registrations. This suggests that, during the early stages of market growth, the adoption of EVs is occurring in a spatially random manner across the local authorities of Scotland.

Local Authority Assessment

The final stage of the analysis concentrates on the five current hot-spots and cold-spots of EV uptake in Scotland by considering their other relevant characteristics. Table 2 summarises the five local authorities with the most and least observed degree of EV adoption in comparison with other attributes of their registered car fleets alongside a number of household and socio-economic characteristics.

Table 2: Characteristics of Local Authorities which have High and Low Levels of Electric Vehicle Adoption

Local Authority	EVs ^{*A}	Hybrid Vehicles ^{*A}	Company Cars ^{*A}	EV Charge Points ^{*B}	Multi-Car Households ^C	University Qualified ^C	Mean Income (£) ^D
<i>Hot-Spots</i>							
Orkney Islands	4.087	1.140	45.91	1.520	36%	27%	24400
Dundee City	2.056	3.018	69.84	0.660	18%	25%	23500
Stirling	0.984	8.139	220.2	0.056	36%	33%	31600
Scottish Borders	0.826	3.530	55.70	0.361	34%	27%	27300
Midlothian	0.814	3.612	54.16	0.203	31%	21%	24800
<i>Cold-Spots</i>							
W. Dunbartonshire	0.165	3.208	60.74	0.165	21%	17%	23100
E. Ayrshire	0.256	3.155	56.14	0.073	29%	18%	23400
Falkirk	0.307	3.994	49.97	0	32%	20%	26200
Highland	0.322	1.909	53.15	0.206	33%	26%	26200
Clackmannanshire	0.324	3.120	44.69	0.283	32%	22%	24600

*: per 1000 registered cars

A: Data sourced from the vehicle licensing statistics database (2014) - <https://www.gov.uk/government/collections/vehicles-statistics>

B: Data sourced from the National Charge Point Registry (2014) - <http://data.gov.uk/dataset/national-charge-point-registry>

C: Data sourced from the Scotland's Census (2011) - <http://www.scotlandscensus.gov.uk/>

D: Data sourced from HMRC (2012) - <https://www.gov.uk/government/statistics/income-and-tax-by-borough-and-district-or-unitary-authority-2010-to-2011>

Examining the additional characteristics of the hot-spot and cold-spot local authorities, differences in their features are challenging to identify. The number of hybrid vehicles and company cars currently registered across cold-spots and hot-spot appears reasonably equal, with this similarity also extending to the proportion of multi-car households and mean personal incomes. More clear differences are apparent in terms of the number of EV charge points installed across cold-spots and hot-spots, with hot-spots tending to have a relatively high level of installations. In addition, current hot-spots have a high prevalence of their resident populations which have attained university level educations.

Summary

This report offers a spatial analysis of the early market for Electric Vehicles (EVs) in Scotland through an examination of the degree of variation in EV registrations which exists across different local authorities. Comparing Scotland to the other nation states of the United Kingdom, it is evident that Scottish EV registrations currently exceed those observed in Wales and Northern Ireland though are behind the level of EV registrations in England.

A significant degree of spatial variation amongst local authorities in terms of EV registrations is clearly visible, with some having experienced substantially higher levels of uptake than others. Focusing specifically on the local authorities which have the five highest (hot-spots) and five lowest (cold-spots) levels of EV registrations, a number of apparent differences can be distinguished in their additional characteristics. Notably, current EV hot-spots in Scotland appear to have a higher degree of installed EV charging points as compared to cold-spots. Additionally, EV cold-spots in Scotland have a lower proportion of their resident population achieving a university level qualification compared to hot-spots.

Two prominent limitations of the analysis should be taken into account when considering the results. Firstly, comparing the local authorities of Scotland against one another (akin to the analysis presented in the Local Authority Assessment section) leads to the analysis being somewhat coarse as the areas are quite large in scale, meaning they can mask the diversity which exists within local authorities. Secondly, the patterns of EV registrations which have been illustrated in this report are likely to change in the future, as the market progresses from niche to mainstream. The analysis outlined in this report may be repeated annually in order to identify alterations which have occurred to account for this dynamic aspect.