Scottish Futures Trust

Review of Plug-in-Vehicle Uptake Data – Summary Report

CITY SCIENCE
delivering decarbonisation

SCOTTISH FUTURES TRUST

1 Executive Summary

1.1 Introduction

Scottish Futures Trust (SFT) and Transport Scotland (TS) are noted that current Plug-in-Vehicle (PiV) registration data may not be taking full account of how PiVs are obtained and used, resulting in the potential underreporting of vehicle numbers in Scotland. City Science has been commissioned by SFT to explore if PiVs are being underreported in Scotland, and if they are, to develop a methodology and spreadsheet tool, to support a more accurate estimation of PiV uptake.

1.2 Approach

This project has comprised of two key steps:

1. **Assess Existing Data:** The key data source for PiV statistics at present is the vehicle registration data published by Driver & Vehicle Licensing Agency (DVLA) via the Department for Transport (DfT). We reviewed this data source for completeness, accuracy and consistency. We then reviewed other data sources including the Society of Motor Manufacturers & Traders (SMMT), and Road Traffic & Census data.
2. **Develop a Revised Approach for Estimating PiV Uptake:** We developed a new approach and a spreadsheet tool to more accurately estimate PiV uptake in Scotland.

1.3 Key Findings

1.3.1 The Underreporting of PiV Uptake in Scotland

We identified two key issues that result in the underreporting of PiV uptake in Scotland:

1. **Unallocated Vehicles:** DfT data has approximately 1-2% of vehicles unallocated, which relates to vehicles that do not have a registered keeper and/or postcode, due to errors e.g. the registration numbers being input incorrectly
2. **Inconsistencies between Privately Registered Vehicles & Company Registered Vehicles:** The percentages of company PiV cars and LGVs registered in Scotland (5% and 4% respectively) are significantly lower than the percentages of company cars and LGVs registered in Scotland, for all fuel types (6% and 7% respectively). This relates to the following reasons:
    a. **Leasing Companies:** Company registered cars were concentrated in a few local authorities where we assume the major car leasing companies are located
    b. **Scottish Commuters to England:** Scottish residents who commute to England may register their PiV at company locations. This is supported by analysis that shows company registered PiV are concentrated in the North West region (17% compared with 5% in Scotland)
    c. **The Impact of Headquarters:** Employees may be working for companies in Scotland but with Headquarters (HQ) in England, as a result company cars may be registered outside Scotland

1.3.2 Revised Approach for More Accurately Estimating PiV Uptake

The revised approach and spreadsheet tool that we have developed mitigate the impacts of these challenges by: redistributing the unallocated PiVs; estimating the number of PiVs that were kept and used by Scottish residents who work in England; re-estimating the number of company registered PiVs in Scotland.

Key Finding

Approximately 40,400 BEVs and 27,100 PHEVs are potentially kept and used in Scotland, indicating that DfT data may be underestimating PiV uptake in Scotland by up to 16%.

1.4 Next Steps

We propose that the findings of this report are cascaded widely including with the DfT and DVLA. Ongoing dialogue with the Welsh Government is also suggested as they are experiencing similar issues with PiV uptake data. We have also identified a number of supplementary data sources that could be explored and considered to support future analysis (see Section 5.2).

2 Introduction

2.1 Background

City Science has been commissioned by SFT to conduct a review of PiV data and to develop a methodology and supporting spreadsheet Tool to estimate PiV uptake more accurately across Scotland. Electric Vehicles (EVs) are a key component to decarbonising road transport, and therefore having an accurate and reliable method to understand their uptake and distribution is key for Scotland to accurately track progress towards their net zero targets.

The key data source for PiV statistics at present is the registration (licensing) data published by DVLA via the DfT. SFT and TS are noted that current PiV registration data may not be taking full account of how these vehicles are obtained and used, resulting in the potential underreporting of vehicle numbers. This report has been commissioned to explore the factors that may lead to the underreporting of PiV uptake in Scotland, and to develop a revised methodology and spreadsheet tool.

2.2 Objectives

This Study has two core objectives:

1. Investigate if the currently available PiV licensing data underestimates PiV uptake in Scotland, and if so, to what extent
2. Develop a revised methodology and spreadsheet tool that supports a more accurate estimation of PiV uptake in Scotland. It also provides evidence-led recommendations to support future interpretation and reporting of PiV registration and licensing data

2.3 Purpose of the Summary Report

This **Summary Report** consolidates the findings of our previous work (the **Data Review Report** and the **Technical Report**) and outlines the key conclusions, recommendations and next steps.

3 Review of Current PiV Data

3.1 Overview

The DfT's vehicle licensing statistics data is the most relied upon data for PiV statistics. Table 1 provides an overview of the datasets. There is a concern that current PiV registration data may not be taking full account of the way in which PiVs are obtained and used, for example, PiVs that are kept and used in Scotland and registered outside Scotland, or people that have moved to Scotland but have not notified the DVLA. These and other issues can result in the underreporting of the number of PiVs registered in Scotland.

Data Reference	Data Source Name	Reference
VEH0142	Licensed PiVs at the end of the quarter by body type, fuel type, keepership (private or company) and upper and lower tier local authority, United Kingdom (UK) from 2009 Q4 (end December)	(DfT, 2022a)
VEH0105	Licensed vehicles at the end of the quarter by body type, fuel type, keepership and upper and lower tier local authority, Great Britain from 2009 Q4 (end December); also UK from 2014 Q3 (end September)	(DfT, 2022b)
VEH0181	PiVs registered for the first time at the end of the quarter by body type and fuel type and upper and lower tier local authority, UK from 2010 Q1	(DfT, 2022c)

Table 1 DfT Vehicle Licensing Statistics Data Sources

3.2 Methodology

In the PiV **Data Review Report**, the existing PiV data sources were reviewed for:

- **Completeness:** The spatial and temporal coverage and any other relevant attributes (e.g. fuel, body type)
- **Consistency:** Crosschecked to ensure different datasets from the DfT were showing a consistent pattern for PiVs
- **Accuracy:** Crosschecked DfT's data against other sources to understand their accuracy

To assess the accuracy of the DfT data, we compared the DfT's Vehicle licensing statistics data outputs with other data sources (see Table 2). The various data sources enabled us to understand the overall volume and spatial distribution of PiVs across Scotland.

Dataset / Information	Source	Reference
Vehicle Registration & Licensing Data	DfT, SMMT	(DfT, 2022a), (DfT, 2022b), (DfT, 2022c), (SMMT, 2023)
Origin-Destination / Travel to Work Data	Office for National Statistics Census 2011	(ONS, 2022)
Traffic Demand & Growth	Road Traffic Statistics (DfT)	(DfT, 2023)
Chargepoint Data	ZapMap	(ZapMap, 2023)
Domestic Chargepoint Grant Data	Energy Saving Trust	(Energy Saving Trust, 2023)

Table 2 Summary of Other Potential PiV Uptake Data Sources

3.3 Findings

Our analysis of existing PiV data determined that DfT vehicle licensing statistics provide a good spatial and temporal coverage of both newly registered vehicles and the cumulative total, and that the data is showing a consistent PiV uptake pattern in both Scotland and UK wide.

We identified that whilst DfT data is the most widely available and accurate data source for estimating PiV uptake in Scotland, there are two key potential issues with the datasets:

1. **Unallocated Vehicles:** DfT data has approximately 1-2% of vehicles unallocated, which relates to vehicles that do not have a registered keeper and/or postcode, due to errors e.g. the registration numbers being input incorrectly. This equates to approximately 15,000 PiVs that were not allocated to any nations or region in the UK by the end of 2022 Q3.
2. **Inconsistencies Between Privately Registered Vehicles & Company Registered Vehicles:** As the Table 3 below shows, the percentages of company PiV cars and LGVs registered in Scotland (5% and 4% respectively) are significantly lower than the percentages of company cars and LGVs registered in Scotland, for all fuel types (6% and 7% respectively).

Location	Car				LGV			
	Private PiV	Company PiV	All Private	All Company	Private PiV	Company PiV	All Private	All Company
England	88%	93%	84%	88%	87%	93%	82%	87%
Wales	3%	1%	5%	3%	4%	2%	7%	4%
Scotland	8%	5%	8%	6%	8%	4%	8%	7%
Northern Ireland	1%	1%	3%	3%	1%	1%	3%	2%
UK (Total)	100%	100	100	100	100	100	100	100

Table 3: National Distribution of Cars by Keepership in 2022 Q3 (DfT, 2022a; 2022b)

The analysis of PiV growth also shows a similar inconsistency between private and company registered vehicles. Figure 1 suggests that whilst the growth of private-registered PiVs is almost identical between Scotland and England, Figure 1 depicts the growth of company registered PiVs is lower in Scotland than in England. This is particularly the case since 2020. Generally, there is a lot more company registrations PiVs in England, rather than Scotland, compared to private registered PiVs.

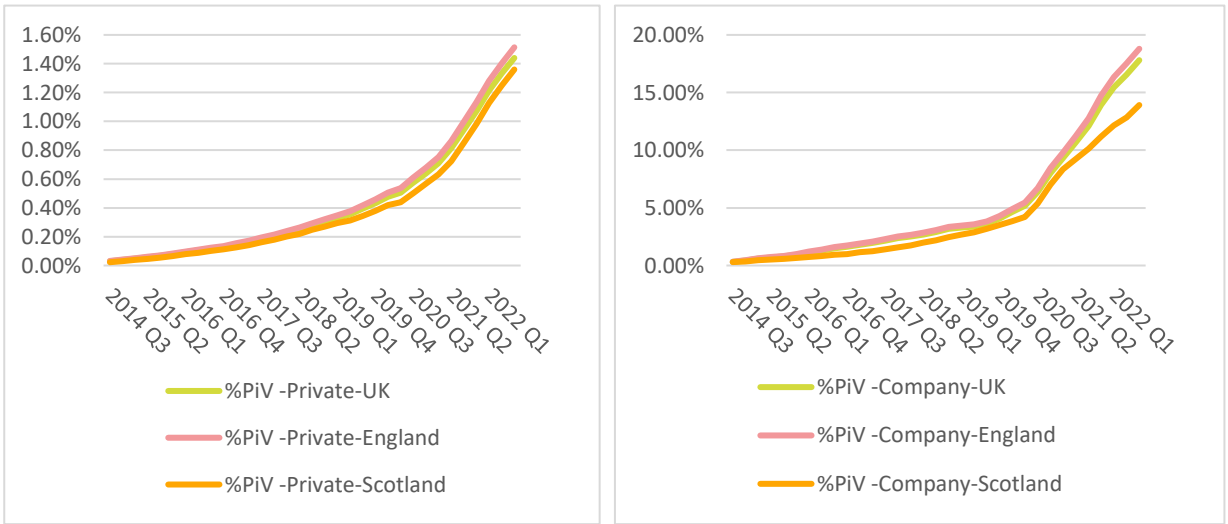

Figure 1: Percentage Change of PiVs, for Private Registered (left) and Company Registered (Right) (DfT, 2022a)

In summary, although the DfT vehicles licensing statistics data is still the only open-source database that can be utilised to estimate the PiV uptake in Scotland, we should not take the PiV data at face value and assume that Scotland has a low uptake. This is due to the following reasons:

- **The Impact of Leasing Companies:** Our spatial analysis (Figure 2) also suggests that company registered cars were concentrated in a few local authorities (e.g. Stockport, Solihull), where the major car leasing companies appear to be located. It was not within the scope of this work to engage with the major lessors. We also note that there are some leasing companies that operate in Scotland which may have a small counter impact.
- **Scottish Commuters to the UK:** Scottish residents who commute to England may register their PiV at company locations (e.g. due to tax incentives). This is supported by the spatial distribution analysis (Table 4) that shows company registered PiV are concentrated in the North West region (17% compared with 5% in Scotland), which is one of the most popular workplace destinations for Scottish residents who are working outside of Scotland based on the 2011 Census Origin-destination datasets.

Area	Company-registered PiVs (Car Only)
Scotland	5.00%
North West	17.00%
North East	1.00%
Yorkshire & The Humber	9.00%
Average	8.00%

Table 4 National Distribution of Company Registered PiVs in 2022 Q3 (ONS, 2022)

- **The Impact of Headquarters:** Employees may also be working for companies in Scotland with their HQs in England (or Wales/Northern Ireland). As a result, the company cars for these employers may be registered to a HQ outside Scotland. For example, there are major employers in the energy and engineering sectors in/around Aberdeen, whose UK operations are headquartered outside Scotland.

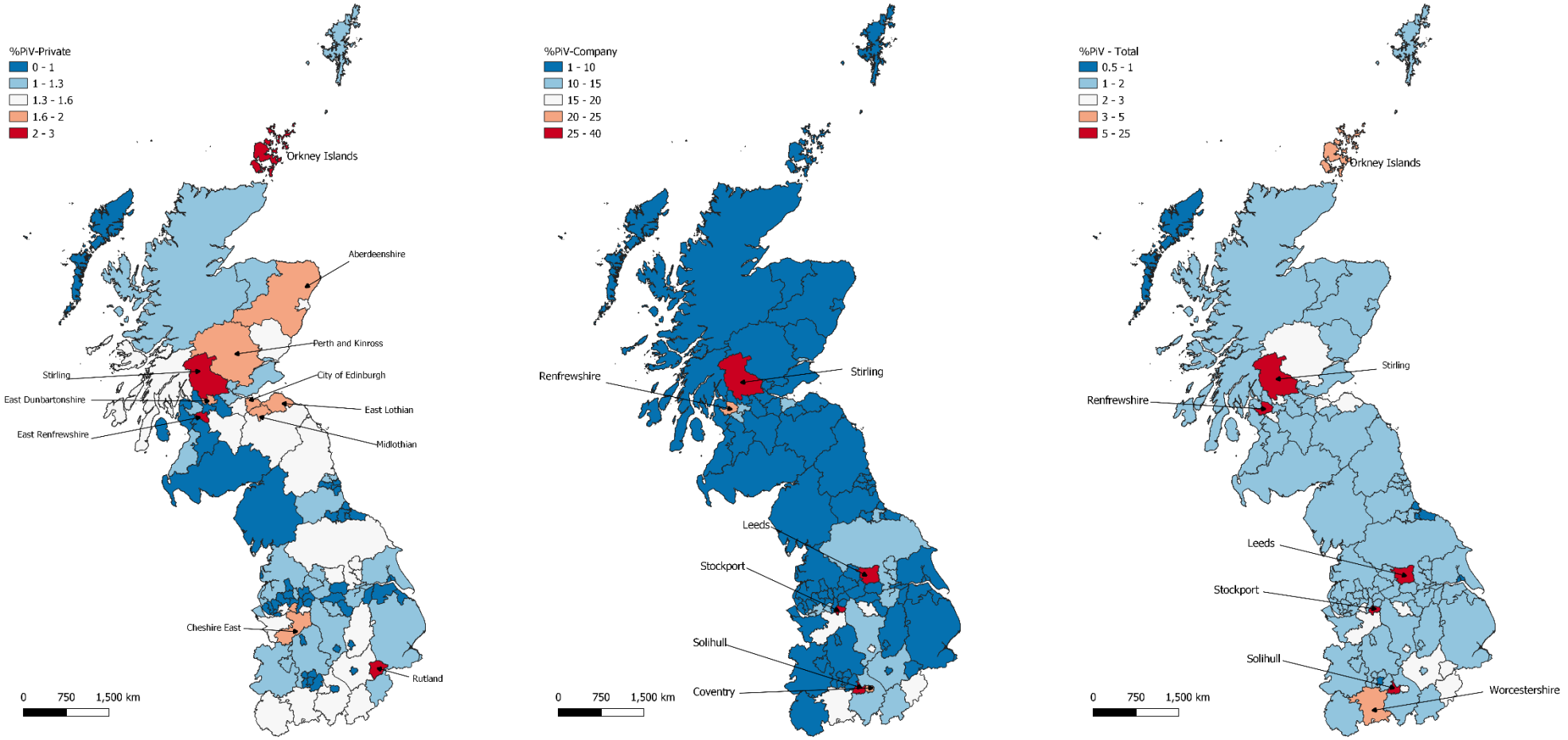

Figure 2 Percentage Share of PiV for Local Authorities in 2022 Q3: Private Registered (Left), Company Registered (Middle) and Total (Right) (DfT, 2022a)

4 A Revised Approach for Collating PiV Uptake Data

4.1 Introduction

To address the issues identified, we have developed a revised approach and spreadsheet Tool for collating PiV uptake data.

4.2 Methodology

The proposed new method for estimating PiV uptake in Scotland provides a range. It consists of a:

- Lower Range: We anticipate that this lower range is still likely to underestimate PiV uptake
- Upper Range: Based on the evidence collated in the previous stage, we are confident that the actual PiV uptake in Scotland is closer to the upper range

The new method is composed of three steps that are summarised below and outlined in Figure 3:

- Step One: Redistribute the unallocated PiV in the DfT licensing statistic dataset to mirror the current distribution of PiVs across all nations in the UK. This addresses the issue regarding unallocated PiVs
- Step Two: Estimate the number of PiVs that were kept and used by Scottish residents who work in England. This addresses the issue that Scottish residents who work in England may have registered their PiV at a workplace in England. This process produces the lower range of predicted PiV uptake in Scotland
- Step Three: Since Step Two only addressed one of the potential reasons why the PiVs uptake was underestimated in the DfT vehicle licensing data, and the other issues as listed in Section 3.3 cannot be addressed separately based on the currently available data. In this step, we calculated the average percentage of PiVs in Scotland and its nearby regions (i.e. North East, North West, Yorkshire and the Humber), and then we used average percentages to re-estimate the number of company registered PiVs in Scotland. This addresses all three of the key issues that result in the underestimation of PiV uptake in Scotland, and produces the upper range of PiV uptake

4.3 A Spreadsheet Tool for Estimating PiV Uptake

Using the steps outlined above, we have developed a spreadsheet tool to estimate the upper and lower ranges of PiV uptake across BEVs, PHEVs and total in Scotland. The tool utilises the DfT vehicle licensing data as the main data source, and then incorporates modifications to address the issues as identified in Section 3. Further details and the User Manual are outlined in full in the Technical Report.

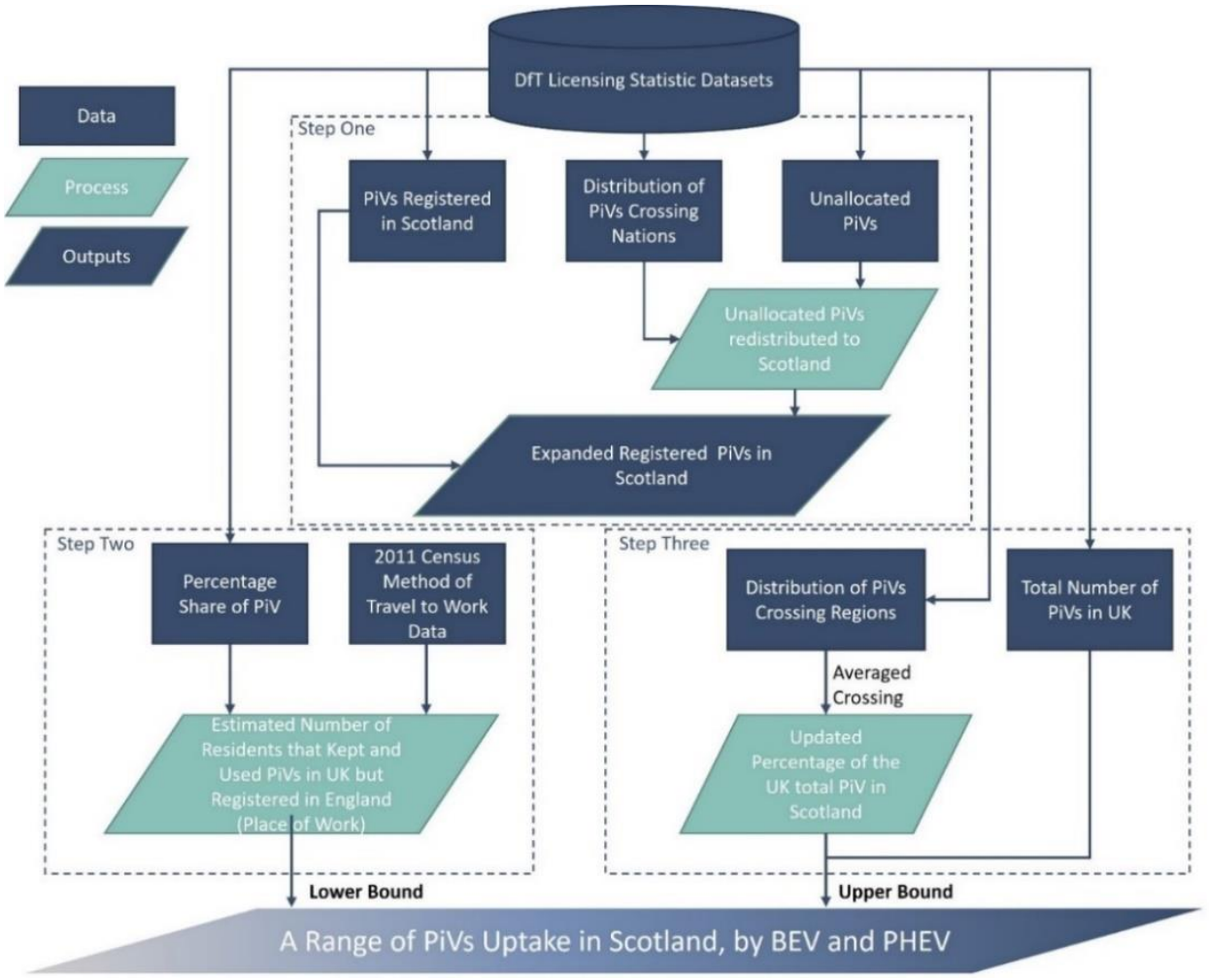

Figure 3 Process Flowchart

4.4 Findings

Table 5 below shows the final estimation (i.e. lower and upper range) of PiV uptake in Scotland by the end of 2022 Q3. The percentages in the brackets show the proportion of Scottish PiVs compared to the UK total.

PiV	DfT Licensing Data	Estimated Lower Range	Estimated Upper Range
BEV	35,900 (5%)	36,500 (6%)	40,400 (7%)
PHEV	22,300 (5%)	22,700 (6%)	27,100 (8%)
Total	58,200 (5%)	59,200 (6%)	67,500 (8%)

Table 5 Estimated Total Number of PiVs in Scotland, by 2022 Q3

Based on currently available data sources, we are unable to provide a precise indication of PiV uptake in Scotland. The rationale for the assumption that actual PiV uptake in Scotland is closer to the upper range, is as follows:

- The lower range only addresses the issue of Scottish residents who are driving to their workplaces in England but might have registered their PiV at their workplace. This is one of three potential reasons why PiVs would be predominantly driven in Scotland but registered outside

- The major car leasing companies, which may invest in PiVs (e.g. due to incentives, fuel economy) are mainly based outside Scotland
- Scottish based companies with HQs outside of Scotland, may have centralised their PiV registration to the HQ outside Scotland

4.4.1 Implications of the Findings

Unfortunately, there is insufficient evidence to provide a more detailed indication of PiV uptake i.e. a precise figure, hence the proposal to use a range until a more robust means to determine PiV uptake is explored.

Underestimating PiV Uptake in Scotland

The analysis shows that approximately 40,400 BEVs and 27,100 PHEVs are potentially kept and used in Scotland. As a result, DfT licensing statistics may have underestimated PiV uptake in Scotland by up to 16%.

5 Conclusions, Recommendations & Next Steps

5.1 Conclusions

Our findings provide evidence that current mechanisms for monitoring PiV uptake in Scotland (namely DfT's vehicle licensing statistics data) results in the underreporting of PiV uptake, with the two key issues being data gaps (e.g. vehicles that do not have a registered keeper or postcode), and vehicles registered in England but driven predominantly in Scotland. We therefore propose that the DfT's data is not the sole data source used for estimating PiV uptake.

In response to the challenge of accurately predicting PiV uptake in Scotland, we have developed a three-step approach, which provides a lower and upper range for estimating uptake. Our findings indicate that the upper range provides the most realistic indication of actual PiV uptake in Scotland. Utilisation of the method outlined in Section 4.2 will avoid the significant underreporting of PiV uptake which our analysis indicates stood up to 16% for Q3 of 2022.

We found insufficient evidence to provide a more detailed indication of PiV uptake (i.e. a precise figure), hence the proposal to use a range until a more robust means to determine PiV uptake has been identified.

5.2 Recommendations

5.2.1 Short-Term

In the short-term we propose Scotland utilises the methodology and tool that we have developed to estimate PiV uptake more accurately in Scotland. This will include updating the PiV update finding as new data becomes available. For instance, when the new Scottish Census data is released in summer 2023.

5.2.2 Medium-Term

In the longer-term, we propose additional data sources are explored to supplement the DfT data. Table 6 summarises the additional independent data sources that could be utilised. For each data source we have assessed its pros and cons. Note the options are listed in order of prioritisation, with one being the highest ranking, and 4 the lowest.

Source	Pros	Cons
Access SMMT UK Vehicles in Use Data	• Includes spatial break down to postcode sector level • Derived from DVLA data but enhanced and cleansed by SMMT • Low cost (£250 excl. VAT p/a)	• Lack of transparency on SMMT's methodology
Access ANPR data	• Assess PiV uptake based on road traffic data • Data should be available from LAs/Transport Scotland	• Time to collate & analyse the data • Potential fee • Likely to be an additional DVLA fee to match VRMs to vehicle types • Only an indicative sample of uptake
ZapMap Charging Survey & Raw Data	• Chargepoint use, by type, location, home and public network separately • EV sample data, including usage, models, age and regional distribution	• Costs £2995 + VAT (annual report) • Sampled data (The survey only includes the chargepoint and EVs using ZapMap app)

Source	Pros	Cons
Household Survey	• Household Survey on PiV uptake in Scotland • Understand the drivers for changes and the foundation of building a statistic model to test policies	• Time consuming and expensive to conduct, response rate has a big impact on the results • One of the above data sources is required to validate the statistical model

Table 6 Potential Supplementary Data Sources

5.3 Next Steps

We have identified a number of opportunities to maximise the impact of this report.

1. Cascade the Findings: The report findings should be cascaded to relevant officers including at SFT, DfT and TS. We also propose that engagement with the DVLA is considered to explore potential opportunities to rectify issues relating to the vehicle registration process (e.g. leasing company HQs skewing data).
2. Maintain Dialogue with the Welsh Government: We understood that the Welsh Government has been exploring a similar issue regarding the underreporting of PIV uptake. We propose that SFT continue to engage with the Welsh Government to compare findings.
3. Explore Supplementary Data Sources: To obtain a more robust and precise estimate of PiV uptake, we propose additional independent data sources are considered (e.g. SMMT or ANPR data). The options outlined in Section 5.2 should be carefully considered and assessed.

Bibliography

DfT, 2022a. *VEH0142: Licensed plug-in vehicles (PiVs) at the end of the quarter by body type, fuel type, keepership (private and company) and upper and lower tier local authority: United Kingdom.* [Online]
Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1123252/veh0142.ods
[Accessed 08 March 2023].

DfT, 2022b. *VEH0105: Licensed vehicles at the end of the quarter by body type, fuel type, keepership (private and company) and upper and lower tier local authority: Great Britain and United Kingdom.* [Online]
Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1123248/veh0105.ods
[Accessed 08 March 2023].

DfT, 2022c. *PiVs registered for the first time at the end of the quarter by body type and fuel type and upper and lower tier local authority, United Kingdom from 2010 Q1.* [Online]
Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1123257/veh0181.ods
[Accessed 08 March 2023].

Energy Saving Trust, 2023. *Domestic Charging Point Grant Data,* s.l.: s.n.

ONS, 2022. *Special Workplace Statistics - LAD Level.* [Online]
Available at: https://statistics.ukdataservice.ac.uk/dataset/wu03uk-2011-sms-merged-lala-location-usual-residence-and-place-work-method-travel-work
[Accessed 07 March 2023].

Shufflebotham, M., 2023. *Electric vehicle market statistics 2023.* [Online]
Available at: https://www.zap-map.com/ev-market-statistics/
[Accessed 09 March 2023].

SMMT, 2023. *Electric Vehicle and Alternatively Fuelled Vehicle Registrations.* [Online]
Available at: https://www.smmt.co.uk/vehicle-data/evs-and-afvs-registrations/
[Accessed 09 March 2023].

ZapMap, 2023. *EV Charging Statistics 2023.* [Online]
Available at: https://www.zap-map.com/statistics/#share
[Accessed 06 March 2023].