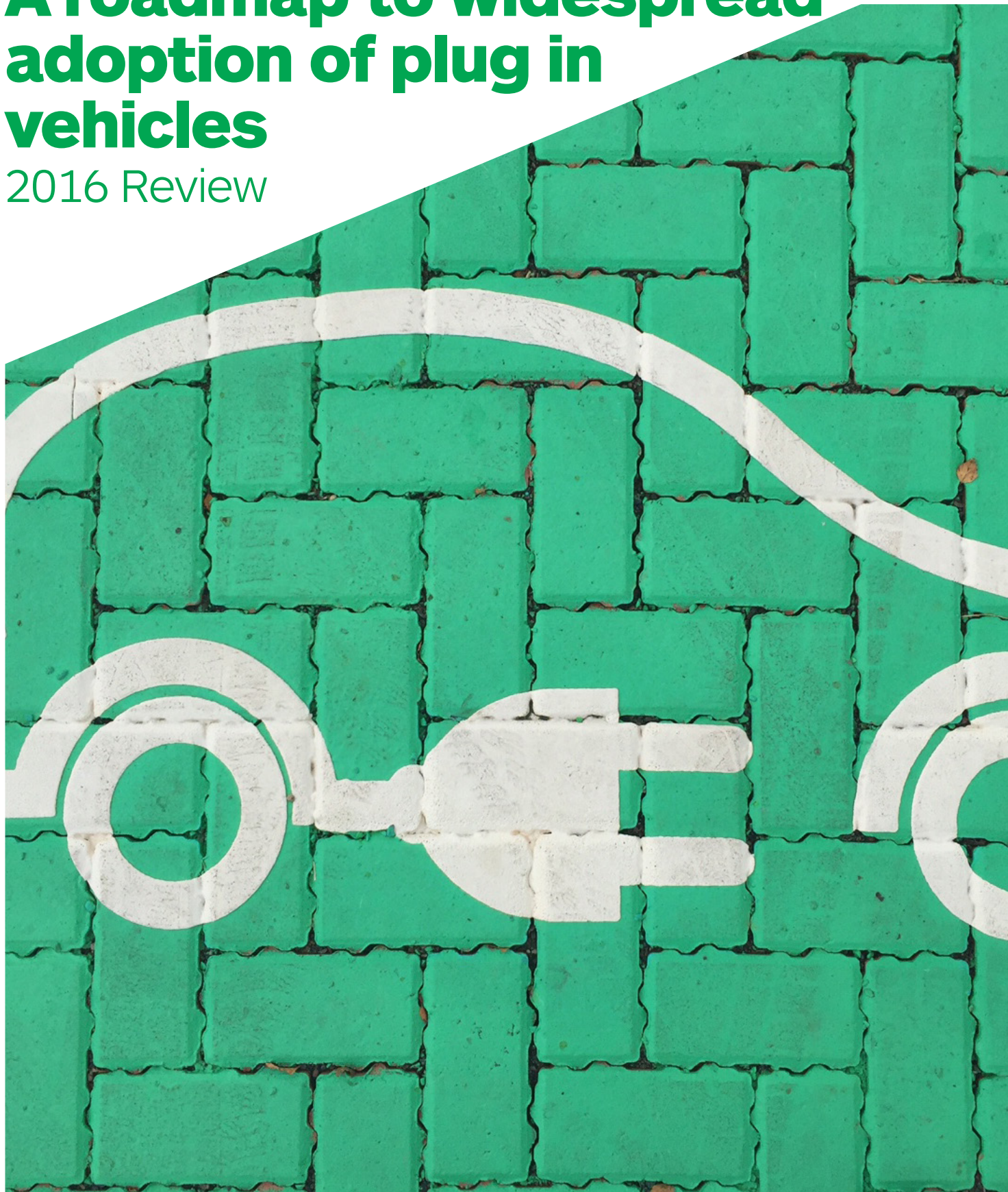




Switched on Scotland: A roadmap to widespread adoption of plug in vehicles

2016 Review



This Roadmap review was developed by Urban Foresight and Transport Scotland



Front cover image: Borders Railway charge point, courtesy of Ewan Swaffield

Ministerial Foreword



In 2013, we published our plug-in vehicle Roadmap, Switched On Scotland. The Roadmap set out a comprehensive strategy and a suite of actions to realise our ambitious vision of freeing Scotland's towns, cities and communities from the damaging emissions of petrol and diesel-fuelled vehicles by 2050.

Achieving this vision is important for several reasons. It will play a major role in almost completely eradicating CO₂ emissions from the road transport sector. It will help remove harmful pollutants from our air and improve the health and wellbeing of people across Scotland. It will help us make the most of our ever expanding renewable energy sector and also support the creation of new jobs and business opportunities across the plug-in vehicle supply chain and wider economy.

This is a fast moving area, technology is rapidly evolving and the plug-in vehicle market is growing. To ensure we are making progress towards our vision and continue to have an action plan in place that complements the current state of the market, we are undertaking a refresh of the Roadmap.

This report represents the first phase of the refresh process. It takes a detailed look at progress we've made since 2013, against the goals and actions in the Roadmap. There are key areas of success, for example: every one of Scotland's 32 community planning partnerships now have plug-in vehicles in their fleets; plug-in only taxi and car club fleets are operating in Scotland; and we have one of the most comprehensive networks of rapid charging points in Europe.

We are using this document as the basis for engagement and consultation with members of our E-cosse plug-in vehicle partnership which comprises more than 150 different organisations, including vehicle manufacturers, charge point suppliers, councils and universities, and other public and private sector organisations. This engagement will inform the development of a refreshed plug-in vehicle action plan, which we will publish by Spring 2017.

This is an exciting area with the potential for a widespread transformation in the way we travel and a variety of climate, health and economic benefits. I'd like to thank partners for their input to E-cosse and delivery of the Roadmap to date and I look forward to working with you as we move forward.

A handwritten signature in blue ink, appearing to read 'H. Yousaf'.

HUMZA YOUSAF

Minister for Transport and the Islands

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1 Introduction

In September 2013, Transport Scotland published [Switched On Scotland: A Roadmap to Widespread Adoption of Plug-in Vehicles](#). This document set out a strategy to free Scottish towns, cities and communities from the damaging emissions of petrol and diesel-fuelled vehicles by 2050.

Recognising the rapid pace of change in technologies and markets for plug-in vehicles, the Roadmap included a commitment to review early progress and identify any areas in which further action is required.

This review fulfils the first part of this commitment by evaluating progress, both at a strategic level and against the 37 individual actions outlined in the Roadmap. This review will also be used to inform the development of a new plug-in vehicle action plan, outlining key next steps over the medium term, which will be published by Spring 2017.

1.1 Structure

This report is structured as follows:

- Chapter 2 restates the vision and outlook set in the Roadmap.
- Chapter 3 outlines the seven factors identified in the Roadmap that influence adoption, and the goals set for each.
- Chapters 4 to 10 assess each goal outlined in the Roadmap by reviewing the progress to date.
- Appendix A contains a summary of progress against all 37 actions in the Roadmap.

2 Vision

2.1 Roadmap Vision

The following vision statement is taken from the Roadmap, and sets out its ultimate objective. It builds on the Scottish Government's commitment to achieve almost complete decarbonisation of road transport by 2050, and emphasises that all relevant public and private stakeholders can play an active role in facilitating this transition.

By **2050**, Scottish towns, cities and communities will be free from the damaging emissions of petrol and diesel fuelled vehicles. A significant reduction in greenhouse gas emissions will be accompanied by marked improvements in local air quality, noise pollution and public health. Scotland will also enjoy increased energy security and new economic opportunities through leadership in sustainable transport and energy technologies.

A key ambition is that by **2040** almost all new car sales will be near zero emission at the tailpipe and that by **2030** half of all fossil-fuelled vehicles will be phased-out of urban environments across Scotland. Plug-in vehicles running on Scotland's abundant green electricity will make a substantial contribution to this. Electric and plug-in hybrid electric vehicles will be widely used as part of a sustainable transport system and will support progress towards a cleaner and smarter energy grid.

Actions taken in the early market up to **2020** will see increasing adoption of plug-in vehicles and establish foundations for long-term growth. This will be delivered through the commitments of all relevant public and private stakeholders and driven by increased awareness and confidence in the technology. Change will be made actionable through promotion of the opportunities and incentives for adopting plug-in vehicles, as well as developments in the necessary skills and business models.

Progress will be further supported by having a network of recharging infrastructure in place across Scotland by **2015**, which will develop to meet the needs of the market.

2.2 Outlook

As a developing market, progress towards this vision is expected to proceed in three phases: *Launch*, *Growth* and *Take-off* of markets for plug-in vehicles (Figure 1).

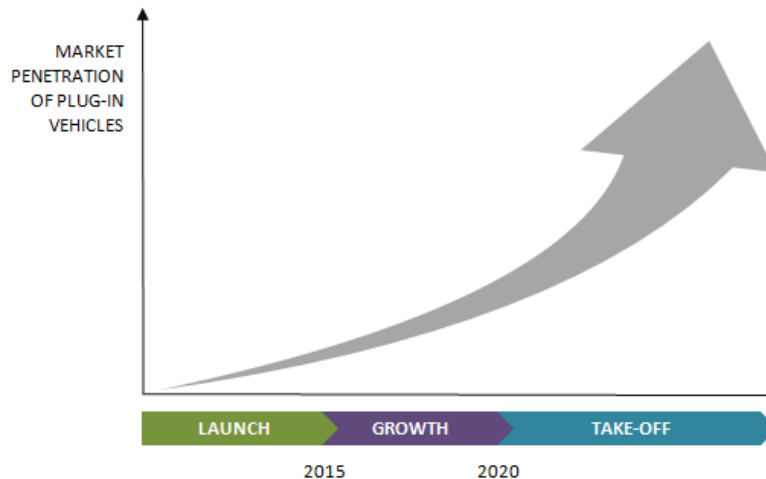


Figure 1 – Three phases of market penetration of plug-in vehicles

Reflecting on the *Launch* phase up to 2015, there was a four-fold increase in the number of plug-in vehicle sales in Scotland between 2013 and 2014, and a further increase of over 50% to 2015 (Figure 2). Cars eligible for the Office for Low Emission Vehicles' ([OLEV](#)) [Plug-in Car Grant](#), now account for 0.6% of all car sales in Scotland.¹

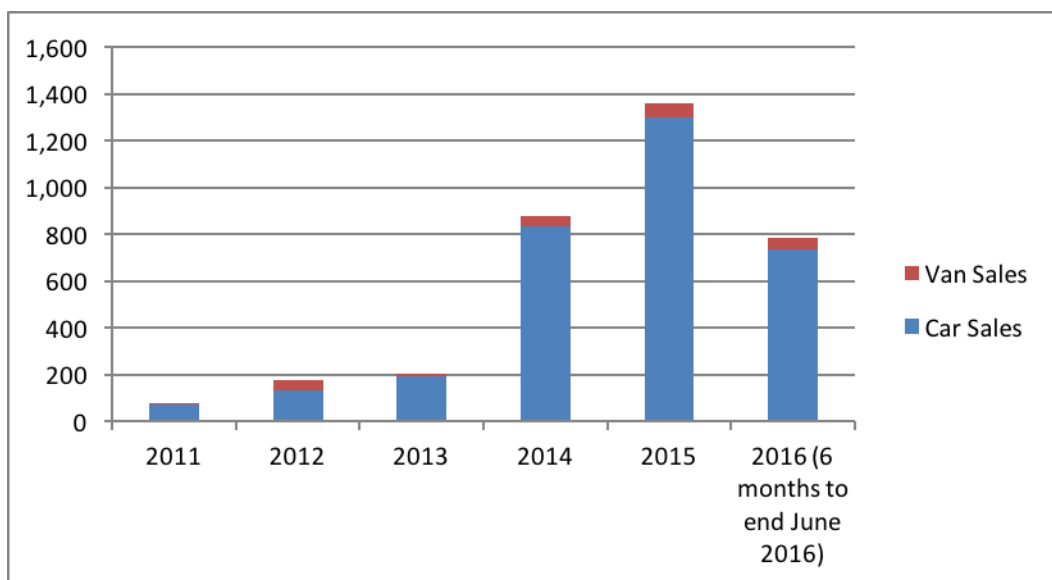


Figure 2 – Sales of plug-in grant eligible ULEV cars and vans in Scotland (Source: Department for Transport)

¹ Urban Foresight analysis of Department for Transport vehicle registration data

This data supports the Roadmap vision that actions taken in the early market will see increasing plug-in vehicle adoption. There have been a number of initiatives to support this growth, which have targeted public and private sector organisations as well as individuals. There has also been a range of activity designed to increase awareness and confidence in the technology. These measures are summarised throughout the rest of this review document.

We are now entering the *Growth* phase and need to ensure that different strategies, support and actions are deployed over time to respond to the changing requirements of the market and to sustain adoption and use of plug-in vehicles.

Looking beyond 2020, to the *Take-off* phase, a recent review of independent plug-in vehicle uptake forecasts from a range of manufacturers and industry experts broadly suggest that the 2020s will see both a decrease in cost of plug-in vehicles and a corresponding increase in uptake. Some key insights are summarised below.

- Audi expects 25% of the vehicles it sells to be battery electric vehicles or plug-in hybrid electric vehicles in 10 years' time (by 2025)²
- Nissan expects a major inflection point in plug-in vehicle sales sometime between 2019 and 2021.³
- Bloomberg predicts that the 2020s will be the decade of the electric car. By 2022, plug-ins will cost the same as their internal combustion engine counterparts, providing a boost to sales. By 2040, 35% of all new vehicles sales will be plug-ins globally.⁴
- A 2015 International Clean Council on Transportation [review](#) of 16 projections of plug-in vehicle sales in the US, EU, China, Japan and the world found a wide range of projections. Generally, studies which assumed ongoing technological advancement and policy projected plug-in vehicles to account for between 20% and more than 50% of sales by 2030. However, studies considering less policy support and technological advancement projected the share of sales to be between 5% and 10% in the same timeframe.

² Green Car Reports (20 Nov 2015) One-Quarter Of All Audis To Be Electric In 10 Years, Company Says: http://www.greencarreports.com/news/1101061_one-quarter-of-all-audis-to-be-electric-in-10-years-company-says

³ Green Car Reports (23 Oct 2015) Battery Breakthrough To Boost Nissan Electric Cars To One In 10 Sales Around 2020, Exec Says: http://www.greencarreports.com/news/1100581_battery-breakthrough-to-boost-nissan-electric-cars-to-one-in-10-sales-around-2020-exec-says

⁴ Bloomberg Business (25 Feb 2016) Here's How Electric Cars Will Cause the Next Oil Crisis: A shift is under way that will lead to widespread adoption of EVs in the next decade: <http://www.bloomberg.com/features/2016-ev-oil-crisis/>

3 Roadmap Structure

In order to achieve the vision, the Roadmap identified seven factors that will influence adoption, and set long-term goals for each (Figure 3). The following chapters look at progress against each of the seven goals.

In addition, the Roadmap brought together all of the actions into groups of cross-cutting objectives for Government. Progress against these actions is summarised in Appendix A.



Figure 3 – The seven inter-linked areas, long-term goals and cross-cutting objectives identified in the Roadmap

4 Policy Frameworks

The Roadmap established that the Scottish Government, the wider public sector and industry decision-makers will all individually and collectively need to establish the necessary policy frameworks to both guide and accelerate the widespread adoption of plug-in vehicles. Embedding plug-in vehicles into relevant national, local and organisational policies and strategies will motivate the required support, funding and commitments to change. It will also help to realise the full potential for plug-in vehicles to contribute to advances in related policy objectives.

Goal	Plug-in vehicles are embedded in all relevant areas of policy and advance progress on climate change, air quality, renewables, energy security and public health.
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Working towards the widespread adoption of plug-in vehicles now forms part of several significant national policies.

In January 2016, Transport Scotland published a refresh of the [National Transport Strategy \(NTS\)](#). The refresh restated the key strategic outcome to reduce emissions to tackle climate change and improve air quality. The Roadmap and its vision feature in the strategy in relation to decarbonisation of road transport. The refresh also recommended a ‘fuller, collaborative review of the NTS to the next Scottish Government’, and in August 2016 the Minister for Transport and the Islands confirmed that the review will commence in 2016/17. The review will provide an opportunity to further explore the role plug-in vehicles can play in achieving a cleaner, more sustainable road transport sector in Scotland.

The next iteration of the Scottish Government’s Climate Change Plan is scheduled to be laid in Parliament in January 2017. Transport Scotland has stated that accelerating the widespread adoption of plug-in vehicles and other ultra-low emission vehicles (ULEVs), such as hydrogen fuel cell buses, will continue to be a vital strand of its activity to reduce emissions from road transport.

In November 2015, the Scottish Government published [Cleaner Air for Scotland](#), its low emission strategy. The document outlines a vision that *'Scotland's air quality will be the best in Europe'*, and also confirms the commitment to decarbonise transport, clearly making the links between transport, air quality and health. The strategy makes a commitment to continue to deliver the actions contained in the Roadmap in relation to increasing uptake of plug-in vehicles.



Source: Cleaner Air for Scotland 2015

High level planning policy in Scotland recognises the importance of considering plug-in vehicle charging infrastructure in new developments. Supportive text is included in both the [Third National Planning Framework](#) and the [Scottish Planning Policy 2014](#), with the latter stating that *'Consideration should be given to how proposed development will contribute to fulfilling the objectives of Switched On Scotland.... Electric vehicle charge points should always be considered as part of any new development and provided where appropriate.'* In addition, permitted development rights for off-road charge points came into force on 30 June 2014. This allows for the installation of charge points (with restrictions), without the need for an application for planning permission⁵.

As of August 2016, eleven (34%) out of 32 Local Development Plans (LDPs) include at least the consideration for provision of charge points in new developments. For example, [Scottish Borders Council Local Development Plan](#) was adopted in May 2016 and states that: *'New developments should also consider a range of sustainable travel initiatives including the provision of electric vehicle power points.'*

Councils are required to review their development plan at least every five years, including supplementary guidance, therefore the proportion of LDPs including provision for charge points should increase over time.

Strategies at a local level are also increasingly recognising the importance of accelerating the adoption of plug-in vehicles. The majority of Local Transport Strategies written since the publication of the Roadmap in 2013, contain references to plug-in vehicles. For example, the City of Edinburgh Council's [Local Transport Strategy](#) states that *'The Council will use Switched on Scotland...as a guide to advance the adoption of plug-in vehicles in Edinburgh. It will also work with Transport Scotland to progress further opportunities to promote plug-in vehicles within the Council and to local residents and businesses.'*

⁵ The Town and Country Planning (General Permitted Development) (Scotland) Amendment Order 2014

5 Market Development

The Roadmap stated that the transition of plug-in vehicles from niche technology to mainstream markets represents a considerable challenge. While recent growth is encouraging, plug-in vehicles still only account for a small percentage of overall car and van sales. Strategies need to continue to focus on commercialisation and stimulating market growth.

Goal	Plug-in vehicles become more desirable than fossil fuelled alternatives.
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Public sector organisations have been procuring an increasing number of plug-in vehicles, supported by the Transport Scotland-funded Switched On Fleets initiative, which was managed by the Energy Saving Trust Scotland (EST) and Route Monkey. This initiative offered free, evidence-based analysis, identifying new opportunities for the cost effective deployment of plug-in vehicles in each of Scotland's 32 Community Planning Partnerships (CPPs). Transport Scotland provided £2.5 million of grant funding to enable local authorities and their partners, including NHS Boards, emergency services, colleges and universities, to buy or lease plug-in vehicles.

The first phase of Switched on Fleets ran from 2014 to 2016, and resulted in over 240 new vehicles being introduced across the fleets of 50 public sector organisations (Figure 4). To enable them to build on this success, another £1.2 million of Transport Scotland funding for vehicles has been provided to the 32 CPPs in 2016/17.

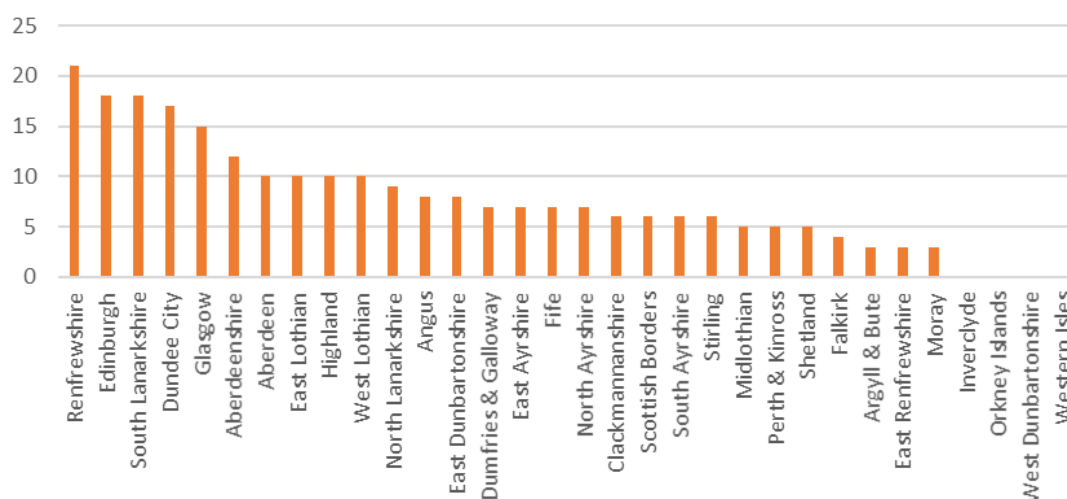


Figure 4 – Number of Plug-in vehicles introduced through the Switched on Fleets initiative, by CPP.⁶

⁶ Transport Scotland Switched On Fleets data. Uptake refers to cars and vans purchased and leased up to the end of 2015-16.



Figure 5 – East Ayrshire Council staff with some of their fleet vehicles, including 7 electric vans funded through the Switched On Fleets initiative (Source: East Ayrshire Council).

On behalf of Transport Scotland, EST and Transport and Travel Research are managing a major monitoring programme for every plug-in vehicle procured or leased via Switched On Fleets. This will involve vehicle tracking (e.g. via on-board telemetry) for a period of 3 years to build a knowledge base of how the vehicles are being operated. Surveys will also be undertaken throughout the programme to gain insights into drivers' and fleet managers' attitudes to plug-in vehicles. This data will help inform the effective deployment of plug-in vehicles within fleets as well as influencing future vehicle procurement decisions.

In addition to the UK Government's plug-in car and van grant, Transport Scotland are providing over £7 million of funding to EST in 2016/17 for a Low Carbon Transport Loan Scheme for both consumers⁷ and businesses⁸. Consumers can apply for a loan of up to £35,000 to cover the cost of purchasing a plug-in vehicle, while businesses can apply for a loan of up to £100,000 which can be used towards a wide range of measures to reduce the business' transport carbon footprint (including the purchase of plug-in cars and vans, up to £35,000 for each vehicle purchased).

Since the publication of the Roadmap, Transport Scotland, COSLA, SCOTS, and local authorities have worked together to explore the potential for local plug-in vehicle incentives to be introduced in Scotland. This resulted in the publication of '*A National Framework for Local Incentives*' in October 2016⁹. The Framework identifies a range of local measures relating to four key areas (planning, parking, road access and taxis and private hire vehicles), that can be implemented and provides guidance and examples of good practice to support successful implementation.

⁷ Energy Saving Trust (undated), Low Carbon Transport Business Loan: <http://www.energysavingtrust.org.uk/scotland/grants-loans/low-carbon-transport-business-loan>

⁸ Energy Saving Trust (undated), Low Carbon Transport Business Loan: <http://www.energysavingtrust.org.uk/scotland/grants-loans/low-carbon-transport-business-loan>

⁹ Urban Foresight (2016) National Framework of Local Incentives for Electric Vehicles: <http://urbanforesight.org/wp-content/uploads/2016/11/REP-1409-TS-A-National-Framework-for-Local-Incentives.pdf>

Transport Scotland also supported [a study commissioned by LowCVP](#) on local measures to encourage the uptake of low emission vehicles.

Local authorities across Scotland are already offering a range of local incentives to promote uptake of plug-in vehicles including free parking, procurement and using licensing to encourage uptake for taxis and private hire vehicles. Dundee City Council, for example, has already made changes to the local licensing regime to encourage taxi and private hire drivers to switch to plug-in vehicles and are in discussion with the industry to introduce further incentives and conditions to promote the use of plug-in taxis in this city. Whilst in Edinburgh, for the past seven years the price of a parking permit has been linked to the CO₂ emissions produced by the vehicle, with lower emitting cars paying less.

Providing information on the benefits of plug-in vehicles and the needs, behaviours and preferences of different customers helps providers and users engage with the market. Both OLEV and EST have produced [comparisons of different plug-ins](#) and [guidance documents for fleet managers](#) on how to incorporate plug-ins into fleets. There has also been a programme of engagement activities including workshops, roadshows and events, which are described further in Chapter 11.

The [E-cosse partnership](#) (discussed further in section 10.1) has also continued its programme of open forums that bring together practitioners from across the public, private and third sectors to share knowledge and expertise to advance plug-in vehicle adoption.



Figure 6 – E-cosse Workshop, Edinburgh. September 2016. (Source: Urban Foresight)

6 Recharging

Providing the infrastructure to recharge plug-in vehicles is an important factor in encouraging their adoption. A [2016 survey by the Department for Transport](#) found that recharging was the factor most deterring driving licence holders from purchasing an electric car or van. This incorporates a range of concerns, such as lack of charging points in their area and a lack of knowledge of where charging points are.

Goal	Targeted convenient and safe recharging infrastructure is deployed across Scotland to meet the changing needs of the market.
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There has been a significant increase in the number and use of charge points in the past few years resulting in Scotland having one of the most comprehensive networks in Europe. Scotland now has the highest ratio of public charge points per household in the UK after North East England and Northern Ireland.¹⁰ As of August 2016, the [ChargePlace Scotland](#) network consisted of over 600 publicly available charge points, equating to over 1,200 charging bays. In addition, over 40 charge points are available in Scotland, through private charge point network operators Ecotricity, Tesla and Chargemaster¹¹.

The rapid charger network has been expanded to enable extended all-electric journeys. Figure 7 shows that the Roadmap ambition for rapid charge points at intervals of every 50 miles on Scotland's primary road network has been achieved, with Figure 8 demonstrating the progress made between 2012/13 and July 2016. As of October 2016, there are over 150 publicly available rapid charge points in the ChargePlace Scotland network.

¹⁰ Urban Foresight Analysis of National Charge Point Register

¹¹ Based on Chargemaster and Tesla network data (August 2016) and National Charge Point Register (March 2016 data set)

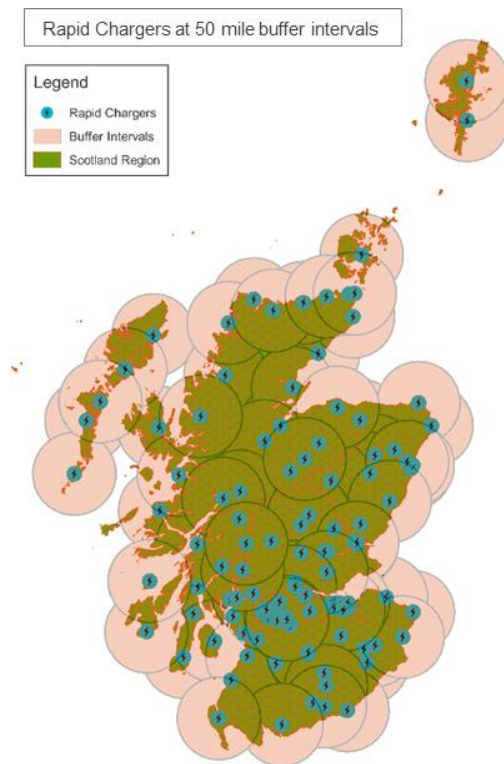


Figure 7 – Rapid charge point network coverage (Source: Urban Foresight analysis of charge point data from National Charge Point Register and Zap-Map)

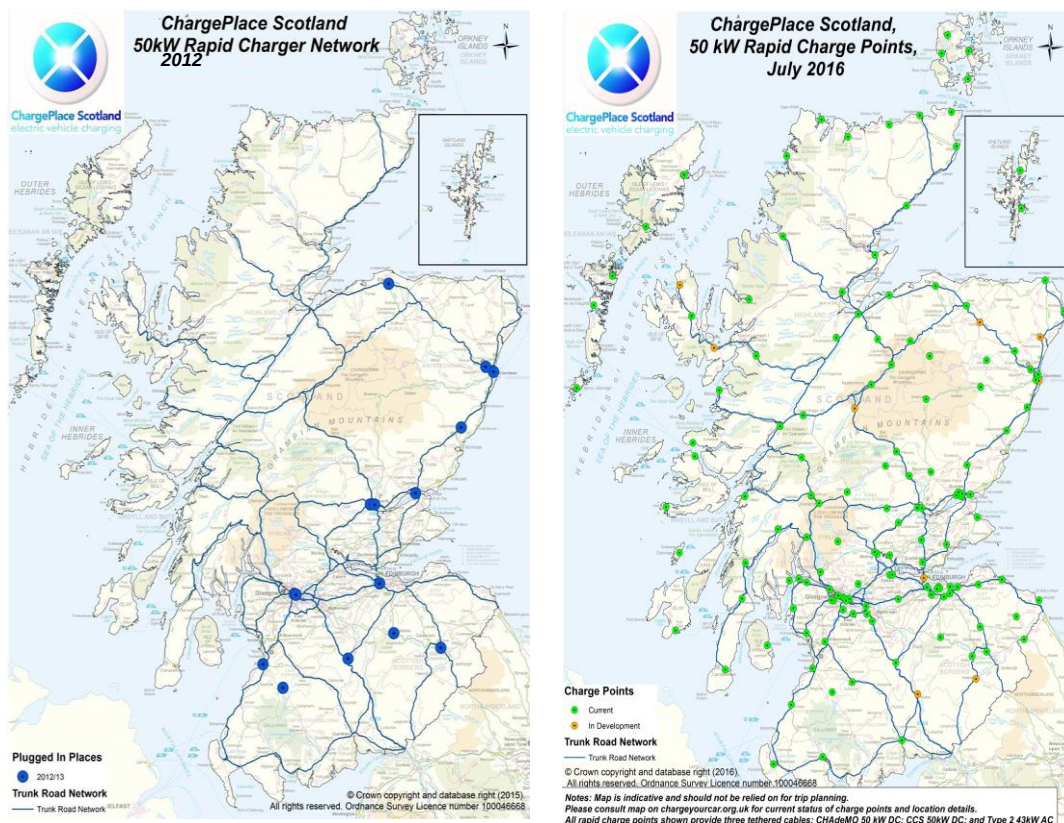


Figure 8 – ChargePlace Scotland Rapid Charger Network 2012/13 to July 2016.

The use of public charge points and the amount of energy drawn from them has increased at a faster rate than the number charge points. Between 2013-14 and 2015-16, while the number of charge points increased by 73%, their usage increased by 638% and the energy drawn increased by 828% (Figure 9).

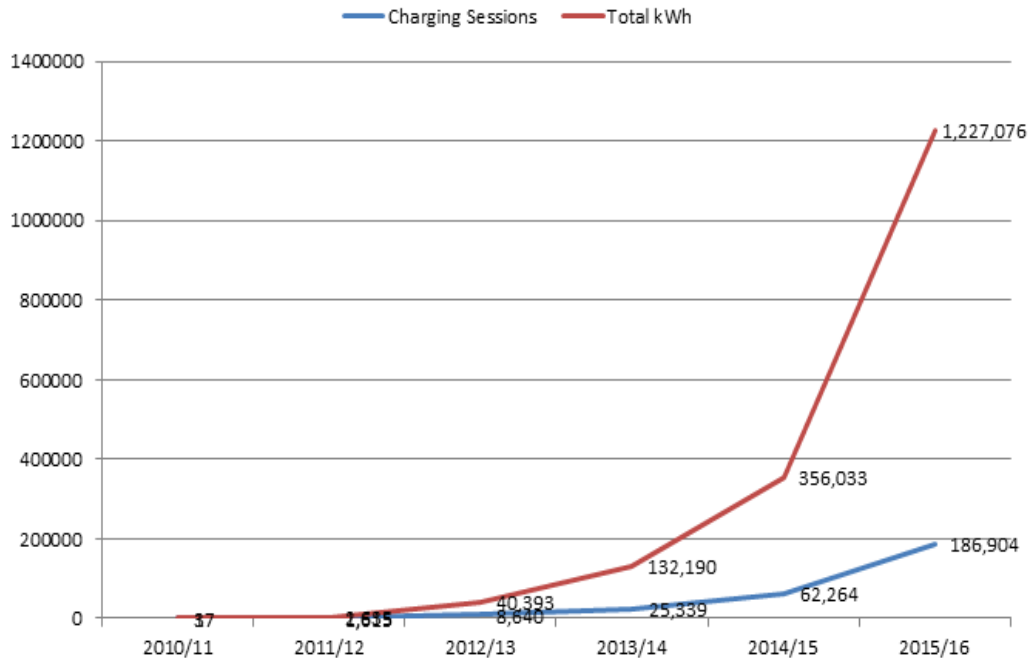


Figure 8 – ChargePlace Scotland usage 2010/11 to 2015/16 (Source: Transport Scotland)

The majority of energy (56%) consumed from ChargePlace Scotland charge points is in the four largest cities, with Dundee consuming the most, followed by Glasgow then Edinburgh and Aberdeen.¹² High energy consumption is also seen in the local authority areas surrounding Dundee and some of the areas around Glasgow (Figure 10).

¹² Urban Foresight analysis of ChargePlace Scotland data

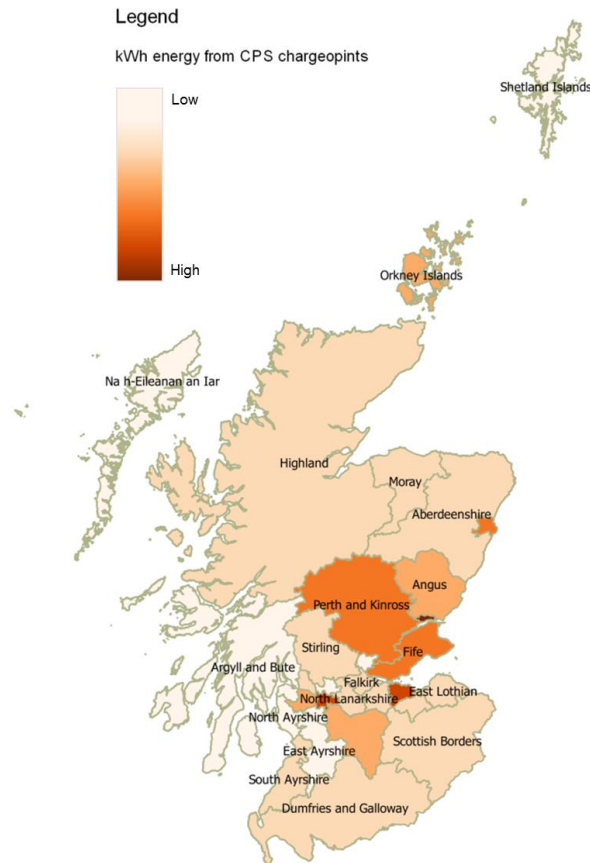


Figure 9 – Indicative variation in energy consumed from ChargePlace Scotland charge points 2015/16 (Source: Transport Scotland)

In August 2016, Charge Your Car was appointed as the new ChargePlace Scotland network operator. As part of the new agreement, the ChargePlace Scotland network will provide an enhanced customer service interface with 24/7 telephone helpdesk, including dedicated ChargePlace Scotland Twitter and Facebook social media platforms. In addition, an enhanced fault management system will be established, with a new dedicated ChargePlace Scotland Operations Manager to be based in Scotland. Following the launch of ChargePlace Scotland, a detailed audit and branding exercise will be undertaken to provide enhanced information to drivers and improved visibility of the network.

There has been targeted investment to provide charge points at hubs for multi-modal journeys. Charge points have been installed at the following ferry terminals: Tarbert, Colonsay, Kilchoan, Castlebay, Oban, Brodick, Kennacraig, Port Ellen, Scrabster, Gill's Bay and Ullapool. The following park and ride sites also have charge points available: Kinross, Kingswells, Dumbarton, Ingliston and Castlevue. In addition, Abellio ScotRail are committed to providing charging facilities at 50 stations across Scotland by the end of 2017, with additional incentives for plug-in vehicle drivers also being considered.

Scottish local authorities have also benefited from support from OLEV, for example Dundee has been selected as one of eight cities to receive a share of the £40

million, available through the Go Ultra Low City Scheme. Funding awarded to Dundee will support the creation of innovative charging hubs in the city.

To support domestic charging, Transport Scotland, via EST, has provided grants to plug-in vehicle owners to enable them to have a charge point installed at their home. As of October 2016, over 870 domestic units have been installed. EST funding of £500, alongside £500 from OLEV, continues to be available in 2016-17.



Figure 10 – 50 kW Rapid Charge Point in the Highlands offering AC Type 2, DC CCS (COMBO 2) and DC CHAdeMO connectors (Source: Urban Foresight)

7 Sustainable Transport

The Roadmap identified that plug-in vehicles have a significant role to play in creating a sustainable transport network across Scotland. The adoption of a low emission alternative by some of the highest mileage vehicles, such as buses and taxis, will have a significant impact on improving air quality, especially in busy town centres. Plug-in vehicles should replace existing petrol and diesel cars and be aligned with the overall ambition to reduce car use in Scotland, thereby not resulting in increased congestion or a decrease in the use of public transport or active travel.

Goal	Plug-in vehicles promote more sustainable transport systems rather than adding to existing problems.
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The Scottish Government has made targeted investments to convert high mileage vehicles such as buses, taxis and car clubs to reduce emissions.

The [Scottish Green Bus Fund](#) (SGBF) provides the opportunity for interested parties (e.g. operators, local authorities, regional transport partnerships) to bid for a grant to help towards the purchase of new Low Carbon Emission Buses (LCEBs). The Fund, through five rounds, has provided almost £13 million of funding, enabling 269 new LCEBs to join the Scottish fleet. Initiatives such as the SGBF have also contributed to the establishment of Alexander Dennis Limited, based in Falkirk, as a leading supplier of low carbon hybrid-electric buses.

There are more than 20,000 taxis and private hire cars in Scotland, offering further potential for increased adoption of plug-in vehicles. EST's Low Carbon Transport Loan offers an interest-free loan of up to £100,000 to businesses, including licensed taxi and private hire operators, to encourage them to switch to plug-in vehicles. In addition, 'Hackney cab' operators can apply for a loan to replace cabs that are at least eight years old with a lower emission alternative.

Dundee City Council is at the forefront of efforts to introduce ultra-low emission taxis and, with funding from EST, has supported local operators in developing a plug-in taxi fleet of over 30 vehicles. The Council has already made changes to the local licensing regime to encourage drivers to switch to plug-in vehicles and discussions are underway with the industry to introduce further incentives and conditions to promote the use of plug-in taxis in the city.

At present, fewer than half of Scotland's local authorities encourage plug-in vehicles to be licensed as taxis and private hire vehicles. EST are therefore taking forward work to encourage them to review their interpretation of licensing regulations, by sharing good practice and enabling local authority officers, licencing board members and operators to learn from areas such as Dundee and Edinburgh, where plug-ins are already being used as taxis or private hire vehicles.

Scottish car clubs currently have almost 10,000 members and a fleet of over 340 vehicles, across 26 locations. There has also been an increase in peer-to-peer car sharing. The Developing Car Clubs in Scotland programme supported the purchase

of new plug-in vehicles into car clubs, resulting in 24% of the Scottish car club fleet being plug-ins. This includes the all-electric E-car, based in St Andrews. In August 2016, there were 81 car club plug-in vehicles in Scotland, more than the rest of the UK combined at that time.¹³ This increased the number of members exposed to plug-ins and offered them the freedom to choose the type of vehicle best suited to each journey.

There has also been targeted investment to provide charge points at hubs for multi-modal journeys (see Chapter 6) including: installation of charge points at 11 ferry terminals and as part of the ScotRail franchise agreement, Abellio ScotRail are committed to providing charging facilities at 50 stations across Scotland by the end of 2017.

To incentivise the use of low emission transport and active travel, the Scottish Government and local authorities are working to understand how low emission zones can most effectively be used to improve air quality. The low emission strategy, Cleaner Air for Scotland, outlines the process for establishing the National Low Emission Framework. This framework will include a standard appraisal process for assessing local air quality measures. The options included in the framework are: low emission zones; clean air zones; other access regulation schemes; traffic management; and, vehicle licencing regulations.

In addition, the [Scottish Government's Programme for Government, 2016/17](#), sets a clear commitment to establishing a first Scottish low emission zone by 2018. Allowing plug-in vehicles access to areas where more polluting vehicles are restricted will be a key consideration in the implementation of this commitment.

¹³ Carplus (2015) The benefits of shared electric vehicles in Scotland: <http://www.carplus.org.uk/wp-content/uploads/2015/10/The-Benefits-of-EVs-in-Scotland-Brochure-3MB.pdf>

8 Energy Systems

As described in the Roadmap, a key advantage of plug-in vehicles is that much of the infrastructure to support their operation is already in place in the form of a national electricity grid. As the number of plug-in vehicles increases in Scotland, the stresses on the energy system are likely to increase. It is therefore important to fully understand how best to integrate plug-in vehicles into the electricity grid. In addition, plug-in vehicles offer the potential to provide smart contributions, such as vehicle to grid, demand side response and intermediate renewable energy storage.

Goal	Scotland's electricity grid supports increased adoption of plug-in vehicles and is made smarter by managed recharging and distributed energy storage.
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Scotland continues to make good progress towards generating renewable energy. Provisional statistics indicate that renewable sources generated 56.7% of gross electricity consumption in 2015, 6.9% higher than in 2014¹⁴, and exceeds the 50% interim target for 2015. Plug-in vehicles have the potential to support the use of renewable energy.

Work has been undertaken to understand the impact and opportunities of increased plug-in vehicle adoption on Scotland's energy system. In April 2015, experts from industry, academia, environmental bodies and local and national government were brought together in an E-cosse forum, exploring the topic of energy systems. This was followed by an industry roundtable in January 2016.



Insights from these events informed the development of a [report on energy systems and plug-in vehicles](#) to support the Scottish Government's twin ambitions of encouraging widespread adoption of plug-in vehicles and developing a secure, sustainable and affordable electricity grid. The report was published in July 2016 and includes chapters on policy, electricity distribution and smart grids, demand management, energy storage and supporting high renewable grids, electrical infrastructure, vehicle-to-x applications and energy markets.

The Scottish Government has also committed to develop an integrated energy strategy, set for publication in 2017, encompassing heat, power and transport, representing an important opportunity to align these areas of policy.

The Scottish Government has commissioned the construction of a whole system energy model for Scotland as a key analytical input into the development of policies and proposals relating to climate change. The model makes a series of investment,

¹⁴ Scottish Government (2016) Energy Statistics for Scotland: <http://www.gov.scot/Resource/0049/00498583.pdf>

operational, primary energy supply and energy trade decisions in order to ensure that demands for energy continue to be met whilst meeting any additional constraints, most notably the requirement to reduce greenhouse gas emissions in Scotland by 80% by 2050.

Projects such as [My Electric Avenue](#) have provided a bottom up approach to plug-in vehicle uptake, focusing on clusters of drivers and their effect on the grid. This has helped give Distribution Network Operators a clearer understanding of charging behaviours and local impacts on the grid. In addition, the trial has given participants a greater understanding of the local electricity grid and the effects of electricity use at certain periods.

9 Economic Opportunity

Economic opportunities associated with the adoption of plug-in vehicles can be divided into two broad categories: Direct opportunities from the development of goods and services associated with plug-ins, such as the manufacture of parts for the vehicles and the provision of charging services; and indirect opportunities from efficiencies or changes in services by existing companies as they adopt plug-ins.

Goal	Early leadership in advancing plug-in vehicles creates jobs and makes Scottish businesses more competitive.
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To promote Scotland as a leading plug-in vehicle nation, the E-cosse partnership has been leading an international dissemination programme, presenting Scotland's story at a range of international events. Locations include: Barcelona, Bratislava, Japan, Ireland and Belgium.

There have also been specific initiatives to encourage the development of new goods and services for plug-in vehicles in Scotland.

The Scottish Enterprise Mobility Integration Challenge was setup in 2013 as part of a vision to make Scotland the global location of choice for the demonstration of Smart Mobility products¹⁵. It closed to applicants in January 2014, after generating 57 collaborative demonstrator project ideas involving over 180 firms. Bidders committed £61 million of investment, seeking £47 million of public sector support and private sector investment.

In March 2016, seven technology companies in Scotland received a share of £2.5m from OLEV and Innovate UK for emission-cutting technology projects¹⁶.

Projects include:

- Sunamp Ltd leading a team to transform chilled or frozen food fleets using 'thermal store' technology to minimise battery power used up to keep food deliveries fresh;
- AGM Batteries Ltd working on sodium-ion batteries for plug-in vehicles.

Transport Scotland has secured European Regional Development Funding and is scheduled to launch a [Low Carbon Travel and Transport Challenge Fund](#) in November/December 2016. This capital funding will support the development of 'hubs', including refuelling facilities for a range of alternatively fuelled vehicles. The

¹⁵ Scottish Enterprise (undated) The Mobility Integration Challenge

¹⁶ DfT. Winners of the OLEV research and development fund. March 2016:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/509132/olev-research-and-development-fund.csv/preview

programme also aims to increase the number of ULEV registration in Scotland by 200. £8 million is available during the first phase, which runs until the end of 2018.

In 2016, Scottish Enterprise provided an R&D grant of £285,000 to Livingston-based Route Monkey¹⁷ to develop new technology to enable plug-in vehicle drivers to follow an optimum route to get the most miles per charge. The funding contributes towards the total project cost of £750,000 and will create four new permanent jobs.

There have been a range of incentives to encourage business to adopt plug-in vehicles including:

- Initiatives to encourage workplace charging (with EST funding the installation of charge points at over 200 organisations to date)
- Financial support such as EST's Low Carbon Transport Loan
- Guidance material and promotional activity

To date, the Low Carbon Transport Loan has supported the purchase of over 130 plug-in vehicles by businesses. For example, East Coast Organics, a farm based in the village of Pentcaitland is using plug-in vans purchased through the loan fund for its delivery operations.



Figure 11 – Minister for Transport and the Islands, Humza Yousaf, visiting East Coast Organics in June 2016 (Source: Chris Watt Photography).

¹⁷ [Scottish Enterprise case study on Route Monkey](#)

There has also been initiatives to make the business case for organisations to adopt plug-in vehicles. Organisations involved in Switched On Fleets, benefitted from analysis that identified opportunities to save fuel and money by incorporating plug-in vehicles. The analysis explored the current usage of the existing fleet, identified which vehicles could be replaced by plug-ins and which models would be most appropriate and cost effective. It also provided organisations with reliable evidence on which to base investment decisions for plug-in vehicles.

Companies like '203020 Electric', which runs the largest all-electric taxi fleet in Scotland, have also benefitted. Supported by Dundee City Council, EST and Transport Scotland and launched in April 2015, the firm reported having driven over a million all-electric miles by February 2016, a target reached well ahead of schedule. Owner David Young said: *"We never expected to hit a million miles so soon but it's terrific that we have. It just goes to show how well the people of Dundee have taken to the idea of electric taxis. And each driver is saving between £120 and £130 a week on fuel so they're delighted."*¹⁸

¹⁸ The Courier (2016) Dundee's electric taxi fleet reaches milestone

10 Communication & Education

The Roadmap stated that to encourage widespread adoption of plug-in vehicles, it will be essential to promote awareness and influence attitudes and skills in order to build confidence in purchasing and using plug-in vehicles. This requires engagement with individuals, organisations and key influencers in the public and private sector.

Goal	Increased awareness and confidence in plug-in vehicles encourages widespread adoption.
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E-cosse forums have been an important mechanism for engaging a wide range of stakeholders from across the plug-in vehicle community. Thirteen forums have taken place up to date, on topics as diverse as integrating plug-in vehicles into fleets; local incentives; communications and outreach; development of the market; and energy systems. There have been over 600 total attendees at the forums, representing over 150 different organisations.

There has also been a broad programme of activities to engage a wide number of people through a range of media.

EST has led a programme of engagement events across Scotland to increase awareness, including plug-in vehicle 'hotspot' events in Kirkcaldy, Broughty Ferry, Tobermory and Dunbar. In September 2016, EST's plug-in vehicle roadshow at Aberdeen Exhibition & Conference Centre, attracted more than 750 visitors, who undertook over 100 test drives.

Furthermore, in September 2015, EST organised a plug-in vehicle rally to promote wider public awareness of vehicles and the ChargePlace Scotland charging network. More than 60 vehicles were displayed in Glasgow's George Square on a busy Saturday, creating a significant amount of public interest. The rally concluded at Stirling University with a presentation by celebrity plug-in vehicle owner and enthusiast, Robert Llewellyn, and generated significant coverage in print and online media.



Figure 12 – Robert Llewellyn, in George Square, Glasgow, to wave off EST's EV Rally, in September 2015. (Source: Energy Saving Trust, Scotland)

April 2016 saw the latest edition of the GreenFleet Scotland show at Ingliston showground, Edinburgh. The event, sponsored by Transport Scotland, EST and Scottish Enterprise, promotes ULEVs to transport professionals and organisations wishing to save money and reduce emissions. GreenFleet Scotland is a mix of an indoor exhibition, a series of topical seminars, outdoor test drives, an 'EV Driving Challenge', and an opportunity for attendees to try EST's FuelGood driver training. The event has attracted 2150 attendees since it launched in 2009.



Figure 13 – GreenFleet Scotland, 2016. (Source: Public Sector Information (PSi) Ltd)

In 2014, Scottish Enterprise and Transport Scotland provided support to expand GreenFleet to a second, consumer-focussed day entitled EVOLUTION. The event enables the public to see and test drive low and zero emission cars and vans, as well as opportunities to meet vehicle owners and learn more about services such as charging infrastructure and car clubs. The event continues to grow, attracting over 1,200 attendees in 2016.



Figure 14 – BMWi8 Evolution Show. 2014 (Source: Public Sector Information (PSi) Ltd)

The content for plug-in vehicles on the [Greener Scotland website](#) was given a major update in September 2013. The website contains information on: the benefits of plug-ins; different types of vehicle; links to arrange test drives; grants and funding available; and support on charging, both at home and publicly available charge points.

Greener Scotland's marketing campaign, 'EVs are Go', was launched in tandem with the Roadmap. The campaign generated significant media coverage including the front page of the Metro newspaper. The campaign created nearly 450 million opportunities for individuals to see and hear about the plug-in vehicles with coverage generated estimated to be worth £2.4 million.

In 2016 Greener Scotland undertook field marketing activity with the 'Electric Cars Have Always Been Fun' campaign, which toured Dundee, Edinburgh, Aberdeen and Glasgow. The display invited participants to 'win an electric car for a year' and enlisted members of the public to participate in follow up research interviews.

The campaign was successful in providing visitors with new information around charging and car performance, with 78% of survey respondents saying they learned something new from their visit.¹⁹ 78% also said the stand increased their interest in finding out more about plug-in vehicles.

¹⁹ TNS (2016) Electric Vehicles Field Marketing Evaluation

The Electric Vehicle Network enables individuals and businesses considering adoption of plug-in vehicles to find and meet others who already drive a plug-in to seek advice. There were over 40 individual members and over 20 business members on the network during 2015/16 and the network was searched 1,820 times.

In addition to awareness raising, there is a need to develop specific skills and knowledge to support widespread adoption of plug-in vehicles. For example, mechanics need to know how servicing a plug-in vehicle is different to servicing a fossil-fuelled vehicle. A review of education and skills provision²⁰ found that the skills market is adapting to the emergence of plug-in vehicles. Courses and qualifications already exist for workers in the retail motor industry, their development often led by industry bodies. There is also evidence that plug-in vehicles are being embedded into wider mechanical and engineering courses in further and higher education.

Furthermore, with the workplace forecast to be the second most common charging location, the [Switched on @Work programme](#) was established in 2015 to support organisations interested in helping their employees identify the benefits of switching to ULEVs. This programme has been supported by complementary assistance in the form of interest free loans, driver training and grant funding for home and workplace charging infrastructure.

²⁰ Urban Foresight (2016) Education and Skills Strategy for Electric Vehicles

11 Moving Forward

The Switched On Scotland Roadmap sets out a comprehensive framework to structure actions and commitments to support the widespread adoption of plug-in vehicles. It establishes that this transformation will extend out to 2050 and will require strategies that change over time to respond to different needs and challenges.

The roadmap describes this transformation in three phases: launch, growth and take-off (shown in Figure 1). This review was undertaken to assess the successes and challenges encountered in the launch phase, and to inform the next phase of actions required to further grow the numbers of plug-in vehicles in Scotland.

These next phase actions will be published in a refresh of the roadmap by Spring 2017. As with the original roadmap, actions and commitments will be informed by extensive consultation with key stakeholders from across Scotland and beyond. This refresh will then provide an updated action plan that builds on the considerable progress made to date and maintains Scotland's ambition to be at the forefront of this change.

Appendix A

A summary of progress against actions in the Roadmap

Public Sector Leadership				
No.	Influencing Factors	Action	Status	Comments
1	Policy Frameworks	Transport Scotland to continue to engage with colleagues across Government and the wider public sector to promote the inclusion of plug-in vehicles in relevant policies and strategies.	Achieved with ongoing activity	Working towards the widespread adoption of plug-in vehicles now forms part of several significant national policies. including: • National Transport Strategy Refresh, • Cleaner Air for Scotland, • Third National Planning Framework , • Scottish Planning Policy. The majority of local transport strategies written since the publication of the Roadmap in 2013 contain references to ULEVs. Supported by funding from Transport Scotland initiatives Switched on Fleets and the Low Carbon Vehicle Procurement Support Scheme, every community planning partnership in Scotland has incorporated plug-in vehicles into their fleet .
4	Policy Frameworks	Scottish Government, as part of ongoing vehicle replacement cycle, to replace fossil-fuelled vehicles with plug-in vehicles, where appropriate.	Achieved with ongoing activity	Transport Scotland has supported the addition of 21 plug-in vehicles into the Scottish Government fleet (~10% of the total fleet) .

Public Sector Leadership				
No.	Influencing Factors	Action	Status	Comments
7	Policy Frameworks	Scottish Government to prepare legislation to implement a new permitted development right for off-road charge points.	Complete	Permitted development rights for off-road charge points came into force on 30 June 2014.
15	Market Development Recharging Economic Opportunity	Transport Scotland to provide funding and work with partners to support evidence-based analysis of public sector fleets to create new opportunities for the deployment of plug-in vehicles.	Achieved with ongoing activity	Public sector organisations have been procuring an increasing number of plug-in vehicles, supported by the Transport Scotland-funded Switched On Fleets initiative, which was managed by the Energy Saving Trust Scotland (EST) and Route Monkey.
20	Recharging	Transport Scotland to install charge points at all main Scottish Government buildings.	Complete	Charge points have been installed at Scottish Government buildings in Aberdeen, Glasgow, Edinburgh, Galashiels, Inverness, Inverurie and South Queensferry.
32	Energy Systems	Scottish Government to consider how best to strengthen guidance for planning authorities relating to plug-in vehicle charge point provision in new developments as part of a review of Scottish Planning Policy.	Complete	High level planning policy in Scotland recognises the importance of considering EV charging infrastructure in new developments. Supportive text is included in both the Third National Planning Framework and the Scottish Planning Policy 2014. In addition, permitted development rights for off-road charge points came into force on 30 June 2014.

Strategic Investments				
No.	Influencing Factors	Action	Status	Comments
2	Policy Frameworks Market Development	Transport Scotland to review the existing evidence base and identify needs for new research or data to support the development of policies which impact on plug-in vehicles, such as air quality, health and energy.	Achieved with ongoing activity	Research has been commissioned on 'Greenhouse Gas Emissions Reduction Potential In The Scottish Transport Sector From Recent Advances In Transport Fuels And Fuel Technologies' to inform the development of the next iteration of the Scottish Government's Climate Change Plan, which is due to be laid in Parliament in January 2017. An Electric Vehicles and Energy Systems report was published in July 2016 to support the Scottish Government's twin ambitions of encouraging widespread adoption of electric and plug-in hybrid vehicles and developing a secure, sustainable and affordable electricity grid.
8	Policy Frameworks Economic Opportunity	Scottish Government and its partners to continue to engage with international plug-in vehicle networks and projects to attract funding and support policy debates.	Achieved with ongoing activity	Transport Scotland and the E-cosse partnership has been represented at a range of international events including Electric Vehicle Symposiums, Mobile World Congress, POLIS and European Electromobility Stakeholder Forum. Locations include: Barcelona, Bratislava, Japan, Ireland and Belgium. Transport Scotland have secured European Regional Development Funding and are scheduled to launch a Low Carbon Travel and Transport Challenge Fund in November/December 2016. This capital funding will support the development of 'hubs', including refuelling facilities for a range of alternatively fuelled vehicles. The programme also aims to increase the number of ULEV registration in Scotland by 200. £8 million is available during the first phase, which runs until the end of 2018.
10	Market Development	Transport Scotland to work with OLEV to share data and insights from the Plugged in Places project.	Complete	Transport Scotland met regularly to share information with OLEV to ensure a joined up approach. This included provision of data on the developing charging network in Scotland, and input into the evaluation of the Plugged in Places programme.

Strategic Investments				
No.	Influencing Factors	Action	Status	Comments
16	Market Development Sustainable Transport Economic Opportunity	The Scottish Government, Scottish Enterprise and partners in the public and private sector to promote Scotland as an attractive location to introduce new consumer offerings and mobility services for plug-in vehicles.	Achieved with ongoing activity	The Scottish Enterprise Mobility Integration Challenge was setup in 2013 as part of a vision to make Scotland the global location of choice for the demonstration of Smart Mobility products . It closed to applicants in January 2014, after generating 57 collaborative demonstrator project ideas involving over 180 firms. Bidders committed £61 million of investment, seeking £47 million of public sector support and private sector investment. Scottish Enterprise also put in place a Smart Mobility 'Champion' in 2013 to grow Scottish capabilities in this area. The Smart Mobility opportunity development programme was closed in December 2015 in order to move to an "industry led" approach aligned with the Scottish Enterprise 'Business As Usual' appraisal procedures and grant support rules. Engineering Scotland's Automotive Forum is seeking assistance from Scottish Enterprise for a "Future of Automotive" event.
18	Recharging	Transport Scotland to continue to provide funding for the safe and convenient installation of domestic, workplace and en-route charge points.	Achieved with ongoing activity	As of August 2016, the ChargePlace Scotland network consisted of over 600 publicly available charge points, including over 150 rapid charging points, equating to over 1,200 charging bays To support domestic EV charging, Transport Scotland has provided grants of up to £500 to EV drivers, via the Energy Saving Trust (EST), to enable them to have a charge point installed at their home. As of September 2016 over 700 domestic units have been installed. EST funding of £500, alongside £500 from OLEV, continues to be available in 2016/17. Via EST, Transport Scotland also funds the installation of charge points at commercial workplaces. As of August 2016, over 200 organisations had benefitted from the scheme.
22	Recharging	Transport Scotland to commission a review of the opportunities to transition infrastructure provision in Scotland from a Government-funded pilot to a private sector-led initiative that meets Scotland's long-term needs for recharging infrastructure.	Ongoing	Scottish Ministers are continuing to fund the growing ChargePlace Scotland network. In August 2016, Charge Your Car Limited were appointed as the Charge Point Network Operator for 3 or 4 years with the new system commencing in October 2016.

Switched on Scotland: A roadmap to widespread adoption of plug-in vehicles

Transport Scotland

Strategic Investments				
No.	Influencing Factors	Action	Status	Comments
24	Recharging	Transport Scotland to roll out a network of pay-as-you-go charge points in Scotland - making payment for charging/parking as straightforward as possible for plug-in vehicle drivers.	Ongoing	Transport Scotland has rolled out a public charging network across Scotland, see Action 18. The majority of charge points provide electricity free to the driver, using an RFID card, online or on phone. Work will continue with the Charge Point Network Operator to review options going forward.
25	Recharging	Transport Scotland to deploy rapid charge points at intervals of at least 50 miles on Scotland's primary road network to enable extended all-electric journeys.	Complete	The rapid charger network has been expanded to enable extended all-electric journeys with rapid chargers at intervals of every 50 miles.
26	Sustainable Transport	Scottish Green Bus Fund to continue to support the wider roll-out of low emission buses across Scotland.	Achieved with ongoing activity	The Scottish Green Bus Fund provides the opportunity for interested parties (e.g. operators, local authorities, regional transport partnerships) to bid for a grant to help towards the purchase of new low emission buses. The Fund, through 5 rounds, has now provided almost £13 million of funding, enabling 269 new buses to join the Scottish fleet.
27	Sustainable Transport Communication & Education	Support for the promotion of shared plug-in vehicles through the Developing Car Clubs in Scotland programme.	Complete	Scottish car clubs currently have almost 10,000 members and a fleet of over 340 vehicles, across 26 locations. There has also been an increase in peer-to-peer car sharing. The Developing Car Clubs in Scotland programme supported the purchase of new plug-in vehicles into car clubs, resulting in 24% of the Scottish car club fleet being plug-ins. This includes the all-electric E-car, club operating in St Andrews . In August 2016, there were 81 car club plug-in vehicles in Scotland, more than the rest of the UK combined at that time.
28	Sustainable Transport	Transport Scotland to continue the deployment of charge points at park and ride sites and other transport interchanges.	Achieved with ongoing activity	There has been targeted investment to provide charge points at hubs for multi-modal journeys. Charge points have been installed at the following ferry terminals: Tarbert, Colonsay, Kilchoan, Castlebay, Oban, Brodick, Kennacraig, Port Ellen, Scrabster, Gill's Bay and Ullapool. Whilst the following park and ride sites also have charge points available: Kinross, Kingswells, Dumbarton, Ingliston and Castlevew.
29	Sustainable Transport	Transport Scotland to encourage the deployment of electric vehicle charging points at railway stations with bidders for the new ScotRail Franchise.	Ongoing	As part of the ScotRail franchise agreement, Abellio ScotRail are committed to providing charging facilities at 50 stations across Scotland by the end of 2017, with additional incentives for plug-in vehicle drivers also being considered.

Strategic Investments				
No.	Influencing Factors	Action	Status	Comments
34	Economic Opportunity	Scottish Enterprise to unite, understand, support and strengthen Smart Mobility activity including (but not limited to) Transport Systems, Informatics and Energy Companies from which economic benefits flow. This will include growing capability and capacity around Smart Mobility, stimulating projects, realising benefits and expanding global reach.	Achieved with ongoing activity	See Action 16

Incentives				
No.	Influencing Factors	Action	Status	Comments
3	Policy Frameworks Sustainable Transport	Scottish Government to determine the role plug-in vehicles can play in Air Quality Action Plans as part of the review of Local Air Quality Management in Scotland.	Complete	In November 2015, the Scottish Government published the low emission strategy, Cleaner Air for Scotland,. The document confirms the commitment to decarbonise transport, clearly making the links between transport, air quality and health. The strategy makes a commitment to continue to deliver the actions contained in Switched On Scotland in relation to increasing uptake of plug-in vehicles.
5	Policy Frameworks Market Development	Transport Scotland to work with Energy Saving Trust and other stakeholders to prepare guidance on the actions that can be taken to promote plug-in vehicles.	Complete	Both OLEV and EST have produced comparisons of different Plug-in vehicles and guidance documents for fleet managers on how to incorporate Plug-in vehicles into fleets. Transport Scotland was on the steering group for research undertaken by the Low Carbon Vehicle Partnership's into best practice for local measures to encourage the uptake of low emission vehicles. A number of Scottish LAs contributed to the development of this report. A report on a National Framework for Local Incentives in Scotland looked at implementation of four specific incentives: parking, road access, taxi licencing and planning. This was published in Autumn 2016.
13	Market Development	Scottish Government to work with the UK Government to assess the future provision of incentives and the most effective way to support the developing markets for plug-in vehicles.	Achieved with ongoing activity	Transport Scotland has regular contact with OLEV, to share evidence and best practice and discuss the provision of current and future incentives. This has led to the provision of complementary funding packages. For example, in addition to the UK Government's plug-in car and van grant, Transport Scotland are providing over £7 million of funding to EST in 2016/17 for a Low Carbon Transport Loan Scheme for both consumers and businesses. Furthermore, Transport Scotland's Switched On Fleets Programme ran in parallel to OLEVs ULEV Readiness project – both with the intention of increasing the uptake of plug-ins in the public sector fleet. Scottish local authorities have also benefited from support from OLEV, for example Dundee has been selected as one of eight cities to receive a share of the £40 million, which was available through the Go Ultra Low City Scheme. Dundee's bid was highly commended and received an award of almost £1.9 million. This will see the creation of innovative charging hubs in the city.

Incentives				
No.	Influencing Factors	Action	Status	Comments
14	Market Development	Transport Scotland to work with local authorities, planning authorities and COSLA to develop a national framework for local incentives.	Complete	Since the publication of Switched on Scotland, Transport Scotland, COSLA, SCOTS, and local authorities have worked together to explore the potential for local plug-in vehicle incentives to be introduced in Scotland. This led to the publication of 'A National Framework for Local Incentives' in Autumn 2016. The Framework identifies a range of local measures relating to 4 key areas(planning, parking, road access and taxis and private hire vehicles), that can be implemented and provides guidance and examples of good practice to support successful implementation. Transport Scotland also supported a study commissioned by LowCVP on local measures to encourage the uptake of low emission vehicles.
17	Market Development	Scottish Government to continue working closely with industry to meet the changing needs of the plug-in vehicle market.	Achieved with ongoing activity	See Action 9 regarding E-cosse. 2016 saw the latest edition of GreenFleet Scotland at Ingliston Showground, Edinburgh. The event has attracted 2150 attendees since it launched in 2009.
30	Sustainable Transport	Scottish Government to work with partners to undertake a study into the development of a national framework for establishing low emission zones.	Complete	The low emission strategy, Cleaner Air for Scotland, outlines the process for establishing the National Low Emission Framework. The framework will include a standard appraisal process for assessing local air quality measures. The options included in the framework are: low emission zones; clean air zones; other access regulation schemes; traffic management; and, vehicle licencing regulations.

Mobilising Stakeholders				
No.	Influencing Factors	Action	Status	Comments
6	Policy Frameworks Sustainable Transport Communication & Education	Transport Scotland to establish a multi-stakeholder group on fleets to review the challenges and opportunities for wider adoption and prepare necessary guidance and advice for public and private sector organisations.	Complete	E-cosse forums were held on investing in plug-in vehicles for fleets. Presentation included how a taxi firm is building its business around cost savings from plug-ins and how optimisation software can help realise savings. Organisations involved in Switched on Fleets had the opportunity for their fleet to be analysed to identify opportunities to save money by incorporating plug-in vehicles. The analysis explored the current usage of the existing fleet, identified which vehicles could be replaced by plug-ins and which models would be most appropriate and cost effective.
9	Market Development	Transport Scotland to continue to co-ordinate partnership working and promote communication across the plug-in vehicle stakeholder community.	Achieved with ongoing activity	E-cosse forums remain an important mechanism for engaging a wide range of stakeholder working toward plug-in vehicle adoption. Thirteen forums have taken place up to September 2016, on topics as diverse as integrating plug-in vehicles into fleets;; local incentives; communications and outreach; development of the plug-in vehicle market; and energy systems. There have been over 600 attendees at the forums representing over 150 organisations from the public and private sector.
19	Recharging Sustainable Transport Communication & Education	Transport Scotland to establish a multi-stakeholder group on recharging to review the challenges and opportunities and prepare necessary guidance and advice for public and private sector organisations	Complete	E-cosse events were held on the future of recharging infrastructure and on rapid chargers. An infrastructure workshop was held in May 2014 to discuss drivers and guidance on procurement and installation of charge points with representatives of Scottish CPPs. E-cosse / Switched On Scotland Refresh Workshop on infrastructure being held in Glasgow on 8th November 2016.
31	Energy Systems	Transport Scotland to establish a multi-stakeholder group on energy systems to review the challenges and opportunities and prepare necessary guidance and advice for public and private sector organisations.	Complete	Work has been undertaken to understand the impact and opportunities of increased EV adoption on Scotland's energy system. A report was published in July 2016 and includes chapters on policy, electricity distribution and smart grids, demand management, energy storage and supporting high renewable grids, electrical infrastructure, vehicle-to-x applications and energy markets.

Mobilising Stakeholders				
No.	Influencing Factors	Action	Status	Comments
33	Energy Systems	Scottish Government to continue to work with energy suppliers to encourage the deployment of tariffs and technologies to manage recharging behaviours and maximise the emission reduction benefits across Scotland.	Achieved with ongoing activity	See Action 31

Outreach & Education				
No.	Influencing Factors	Action	Status	Comments
11	Market Development Sustainable Transport Communication & Education	Scottish Government to develop a plug-in vehicle marketing campaign as part of wider Greener Scotland activity, to raise awareness, promote incentives and communicate benefits of plug-in vehicles.	Achieved with ongoing activity	The Scottish Government ran a marketing campaign, 'EVs are Go', around the launch of the Roadmap to raise awareness. The campaign included: a launch event with strong media attendance resulting in 12 pieces of news coverage including the front page of the Metro newspaper; local media released in key areas; and, targeted consumer and trade news releases resulting in five further articles. The campaign created nearly 450 million opportunities for individuals to see and hear about the Plug-in vehicles with coverage generated estimated to be worth £2.4 million. In 2016 the Scottish Government undertook plug-in vehicle field marketing activity with the 'Electric Cars have always been Fun' campaign stand which toured in Dundee, Edinburgh, Aberdeen and Glasgow. The campaign was successful in providing visitors with new information, around charging and car performance with 78% of survey respondents saying they learned something new from their visit and 78% also saying the stand increased their interest in finding out more about electric cars. Marketing activity will continue into 2017.

Outreach & Education				
No.	Influencing Factors	Action	Status	Comments
12	Market Development Economic Opportunity Communication & Education	Energy Saving Trust to continue to promote its support for Scottish businesses to adopt plug-in vehicles through EV Awareness Raising Workshops, Sustainable Transport Advice Service and Interest Free Low Carbon Transport Loans and FuelGood driver training.	Achieved with ongoing activity	EST has led a programme of engagement events across Scotland to increase awareness of Plug-in vehicles, including EV hotspot events in Kirkcaldy, Broughty Ferry, Tobermory and Dunbar. In September 2016, EST's plug-in vehicle roadshow at Aberdeen Exhibition & Conference Centre, attracted more than 700 visitors, who undertook over 100 test drives. In September 2015, EST organised a plug-in vehicle rally to promote wider public awareness of vehicles and the Charge Place Scotland public charging network. More than 60 vehicles were displayed in Glasgow's George Square on a busy Saturday, creating a significant amount of public interest. The rally concluded at Stirling University with a presentation by celebrity plug-in vehicle owner and enthusiast, Robert Llewellyn, and generated significant coverage in print and online media. Transport Scotland are providing over £7 million of funding to EST in 2016/17 for a Low Carbon Transport Loan Scheme for both consumers and businesses. Consumers can apply for a loan of up to £35,000 to cover the cost of purchasing a plug-in vehicle, while businesses can apply for a loan of up to £100,000 which can be used towards a wide range of measures to reduce the business' transport carbon footprint (including the purchase of electric cars and vans, up to £35,000 for each vehicle purchased).
21	Recharging Sustainable Transport Energy Systems Economic Opportunity Communication & Education	Transport Scotland to develop an outreach and education strategy for plug-in vehicles.	Achieved with ongoing activity	An E-cosse forum on communications and outreach was held in Dundee in October 2015. This informed the production of an internal scoping report on plug-in vehicle communications, to promote awareness, understanding and positive attitudes towards plug-in vehicles. The scoping report helped to inform Greener Scotland marketing activity and will be developed further in the next phase of Roadmap delivery.

Outreach & Education				
No.	Influencing Factors	Action	Status	Comments
23	Recharging Communication & Education	Transport Scotland to continue to develop the electric vehicle content on the Greener Scotland website to provide information on plug-in vehicles, recharging and respond to the needs of EV and PHEV drivers.	Complete	The plug-in vehicles content on the Greener Scotland website was given a major update in September 2013. The website contains information on: the benefits of plug-in vehicles; different types of vehicles; links for arrange test drives; grants and funding available; and, support on charging, both at home and publicly available charge points.
35	Communication & Education	Energy Saving Trust to launch an electric vehicle network tool for individuals and organisations to allow them to speak to current plug-in vehicle owners and experience plug-in vehicles first hand at their local dealerships.	Complete	Electric Vehicle Network launched in Sept 2013. The Network enables individuals and businesses considering adoption of Plug-in vehicles to find and meet others who already use Plug-in vehicles to seek advice. There were over 40 individual members and over 20 business members on the network during 2015/16 and the network was searched 1,820 times.
36	Communication & Education	The Scottish Government and industry bodies to work with Education Scotland to review existing resource provision for schools relating to plug-in vehicles and develop further where appropriate.	Ongoing	An internal scoping report has been developed, taking a wide look at the role of education and skills in achieving the Roadmap's 2050 vision. The report will be used as the basis for further engagement with bodies such as Education Scotland, Skills Development Scotland, training providers and employer groups . . The aim will be to ensure education and skills requirements for the developing plug-in vehicle market are understood and employment and economic opportunities in areas such as niche manufacturing and supply chain are realised.
37	Communication & Education	Scottish Government to work with industry, Skills Development Scotland and other key stakeholders, such as the Scottish Funding Council, to quantify and determine the nature and demand for plug-in vehicle education and skills and review and revise provision accordingly.	Ongoing	See Action 36



**TRANSPORT
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