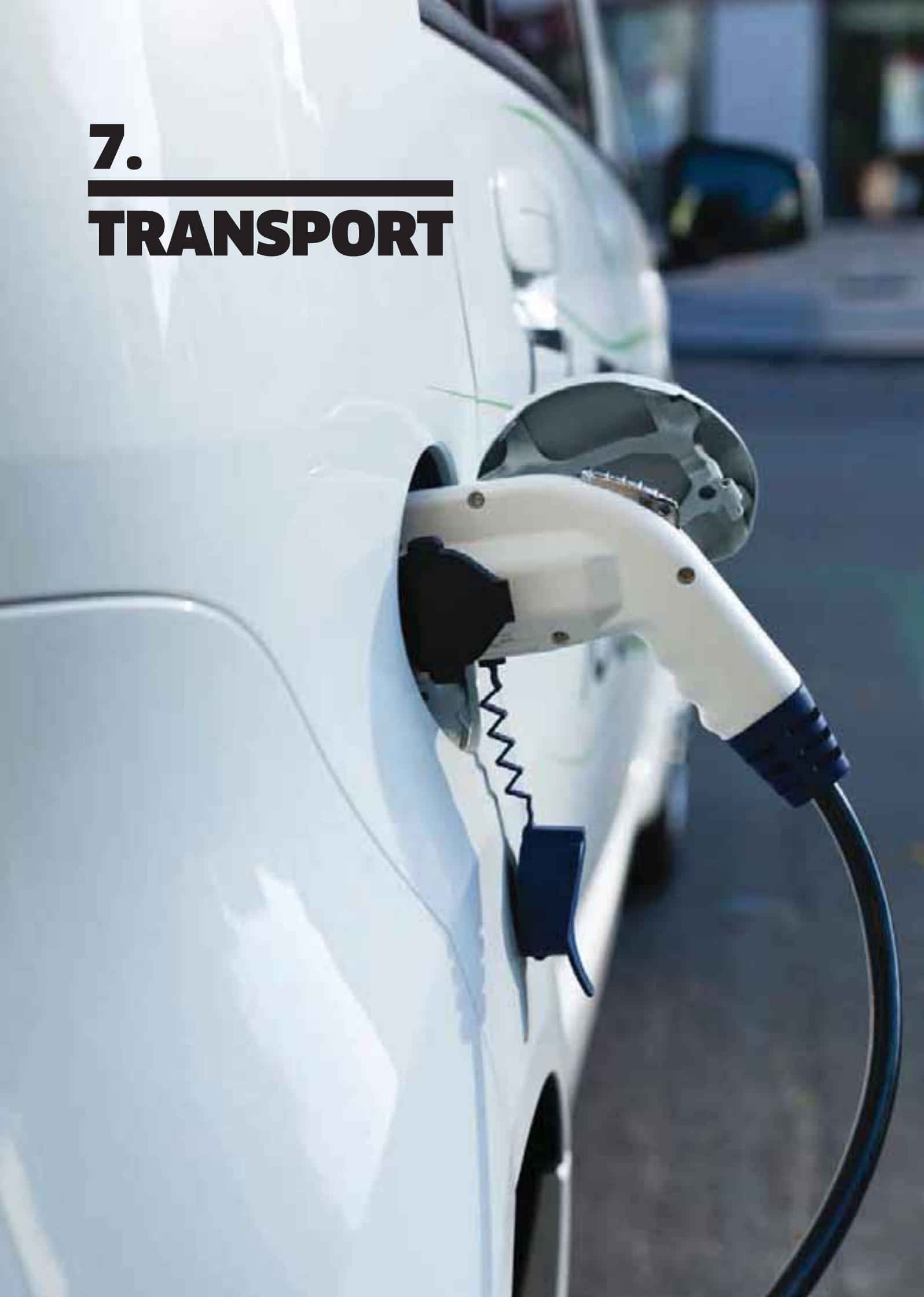


7. --- **TRANSPORT**



7. Transport

7.1 Introduction

7.1.1 Transport emissions, including international aviation and shipping, make up just under a quarter of Scotland's total emissions, and more than two thirds of these emissions come from road transport.

7.1.2 Over the past few decades, there has been a large rise in the distance we travel, mostly through car travel. Around 84% of the 2.7 million vehicles in Scotland in 2010 were cars, 9% were light goods vehicles, 3% were motorcycles, while heavy goods vehicles accounted for about 1%. Active travel, that is walking and cycling, accounts for less than 3% of the total distance travelled each year by Scottish residents.

7.2 Our ambitions for decarbonising transport

7.2.1 Our ambition is for almost complete decarbonisation of road transport by 2050. In RPP1, we set milestones to 2020:

- a mature market for low carbon cars resulting in achievement of an average efficiency for new cars of less than 95 gCO₂e/km;
- an electric vehicle (EV) charging infrastructure in place in Scottish cities;
- personalised travel planning advice provided to all households;
- effective travel plans in workplaces with more than 30 employees; and
- at least 10% of all journeys made by bicycle.

7.2.2 Achievement of our ambitions for decarbonising transport will deliver additional benefits beyond emissions reductions such as: an improvement in air quality due to a reduction in vehicle emissions; less congestion due to the adoption of smarter travel measures, which will promote increased business efficiency; and an improvement in physical and mental well-being due to the increased physical activity in active travel.

7.2.3 We aim to see significant progress in the decarbonisation of road transport by 2030 through wholesale adoption of electric cars and vans, and conversion to hybrid or alternatively-fuelled HGVs and buses – as well as significant steps to decarbonise rail and maritime transport. We are also

aiming for significant modal shift from the private car to public transport and active travel.

7.2.4 Given sufficient progress to 2020, EV uptake could accelerate in the 2020s. Key drivers will be the continued installation of charging facilities, increases in vehicle range, and reductions in cost. By 2030, potentially 60% of new vehicles (over 30% of car and van fleet) will be plug-in hybrid (PIH) or battery EV and hydrogen fuel cells.¹⁹⁹

7.3 Where we are now

7.3.1 In 2011, transport emissions amounted to 13 MtCO₂e or 25.3% of total Scottish emissions, and the majority (9.3 MtCO₂e) were from road transport.^{200, 201}

7.3.2 Overall, transport emissions (including international aviation and shipping) have increased 0.1% since 1990. In 2011, emissions from domestic transport were 0.2% lower than 1990, at 10.47 MtCO₂e, while emissions from international aviation and shipping in 2011 were 2.49 MtCO₂e, up slightly from 2.45 MtCO₂e in 1990 (aviation emissions rose significantly while shipping emissions fell).

7.3.3 However, emissions in 2011 were slightly lower than in 2010 - giving four consecutive years of reductions. In 2011, road traffic distances fell a further 0.2% compared to 2010, attributable mainly to a fall in HGV kilometres. The intermittent recovery from the economic recession clearly continues to play a significant part in the recent reduction in reported transport emissions. However, the current Business as Usual projection for transport emissions suggests that transport emissions will increase by 11% from 13.5 MtCO₂e to 14.8 MtCO₂e between 2013 and 2027.

7.3.4 Emissions from cars currently account for 5.2 MtCO₂e, or around 55% of land-based transport emissions. Average vehicle emissions per kilometre are falling steadily as a consequence of improved engine efficiencies and currently stand at stand at 159 gCO₂e/km. However, these gains have been offset by increased car travel.²⁰² In 2011, the Society of Motor Manufacturers and Traders calculated that average new car emissions in the

¹⁹⁹ Based on the current fleet size (2.3 million) and new car sales of 168,000, these percentages equate to new sales of 100,000 cars and a low carbon car fleet of around 710,000.

²⁰⁰ Scottish Greenhouse Gas Emissions 2011: www.scotland.gov.uk/Publications/2013/06/1558

²⁰¹ The transport estimate includes emissions from international aviation and shipping, but the aggregate Scottish emissions estimate used here does not take account of the EU ETS.

²⁰² This is an internal calculation using Scottish Transport Statistics figure for vehicle kilometres and Scottish emissions data from the National Atmospheric Emissions Inventory (NAEI).

UK fell to 138 gCO₂e/km, down from 190 gCO₂e/km in 1997 and a fall of 27% over the period.²⁰³

7.4 Four packages for decarbonisation

7.4.1 Our transport contribution is set out below as four packages of activity:

- decarbonising vehicles;
- road network efficiencies;
- sustainable communities; and
- business engagement around sustainable transport.

7.4.2 Policies and proposals covering Scotland's transport emissions are anticipated to reduce emissions by **4.0 MtCO₂e** in 2027 from a Business as Usual scenario of 14.5 MtCO₂e.

Package 1 - Policies and proposals to decarbonise vehicles

Policies

7.4.3 **EU Directives** make significant contributions to emissions reductions. The EU Directive on carbon dioxide from cars requires new car fleet average emissions to be 130 gCO₂e/km by 2015, with a target of 95 gCO₂e/km by 2020. For vans, the respective figures are 175 gCO₂e/km by 2017 and 147 gCO₂e/km by 2020.²⁰⁴

7.4.4 We support the UK Government's efforts to press the European Commission for **higher vehicle emissions standards beyond 2020** to deliver further improvements in conventional vehicle efficiency and to provide certainty on future markets for ultra-low carbon vehicles. The UK Government considers a range of emissions of between 50 gCO₂e/km and 70 gCO₂e/km in 2030 to be plausible for new cars and, for new vans, a range of between 75 gCO₂e/km and 105 gCO₂e/km.

7.4.5 The **EU biofuels target** is implemented through the **UK Renewable Transport Fuel Obligation (RTFO)**.²⁰⁵ Currently, it seems unlikely that biofuels will make up more than 10% of transport fuel by volume by 2020. Biofuels could, though, have a role in market segments where there is

²⁰³ SMMT. Average new car CO₂ emissions: www.smmt.co.uk/co2report/#

²⁰⁴ Reducing CO₂ emissions from vehicles: http://ec.europa.eu/clima/policies/transport/vehicles/index_en.htm

²⁰⁵ EC Renewable Transport Fuel Obligation: <https://www.gov.uk/renewable-transport-fuels-obligation>

limited scope for emissions cuts through electrification, for example in relation to conventional cars and vans, buses and coaches, and HGVs (HGV diesel already meets the RTFO).

Proposals

7.4.6 The Scottish interventions below are treated as proposals for emissions accounting purposes. This is because, while in most cases they are already being taken forward, they are not yet being implemented at the intensity required for the abatement figures in this document.

7.4.7 The CCC suggests that by 2020, at least 5% of the car fleet should be electric vehicles (16% of new car sales) in order to provide the ‘critical mass’ for subsequent roll-out. This would amount to 120,000 vehicles with new car sales of around 27,000.²⁰⁶

7.4.8 Our work in the coming years will focus on decarbonising vehicles, particularly through fleet conversion to **EVs** in the public sector, as well as **supporting electric vehicle infrastructure**. Industry will have a key technology development role to play in increasing battery ranges and reducing their costs (costs can currently be prohibitive for some buyers), while manufacturers are expected to develop alternative ownership models for consumers.

7.4.9 We are now in our third year of funding the installation of EV charging facilities and participating in the UK Government’s Office of Low Emission Vehicles’ (OLEV) **Plugged-in Places** initiative.²⁰⁷ The programme will see the installation of a high powered interoperable network of charging facilities across Scotland’s seven cities and primary road network together with commercial workplace and home charging facilities.

7.4.10 During 2013, we are aiming for a network of over 500 double-outlet charging posts, of which over 300 will be publically available across Scotland. This, ultimately commercial, network is to be known as ‘Charge Place’ Scotland.²⁰⁸ Our **Low Carbon Vehicle Procurement Programme** has enabled the purchase of some 270 low carbon vehicles as well as supporting the change of public attitudes towards these vehicles by increasing their visibility.²⁰⁹ We have invested over £8 million in these programmes over the past three years.

²⁰⁶ Assuming new car sales and fleet size on a par with 2011 figures. In practice, new car sales and fleet size are likely to be marginally above the 2011 level so absolute sales are likely to be higher.

²⁰⁷ Plugged in Places: www.gov.uk/government/publications/plugged-in-places

²⁰⁸ Charge Place Scotland: www.greenerscotland.org/greener-travel/electric-vehicles/chargeplace-scotland

²⁰⁹ Low Carbon Vehicle Procurement Programme: www.transportscotland.gov.uk/road/sustainability/low-carbon-vehicles

7.4.11 We are reliant on the development programmes of various vehicle manufacturers who, in European terms, are only releasing low carbon vehicles for sale from spring 2013 onwards. This should result in greater opportunities for society to purchase vehicles. Our 'Charge Place' charging infrastructure will be ready for use and undergoing further roll-out across all of Scotland.

Electric vehicles and the grid

There are a number of important reasons to manage and influence electric vehicle recharging behaviours. Firstly, it enables the greatest carbon reduction benefits, as recharging at times of low overall demand makes it more likely that renewable energy sources will provide most of the electricity. In contrast peak surges in demand are currently met by switching on high-carbon coal or gas generators.

Managed recharging can also support increased electricity generation from wind turbines and other renewable sources. The recharging of plug-in cars can be matched to the fluctuating levels of generation from renewable sources, helping to balance energy systems and charge with green electricity that might not otherwise be used.

Smart and controlled recharging will also limit the requisite need for grid reinforcement, and avoid overloading local networks at times of peak demand. Moreover, plug-in vehicles could ultimately reduce peak generation requirements. In the short to medium-term, this is most likely to be in the form of vehicle-to-home applications, with surplus capacity in plug-in vehicle batteries used to run domestic appliances. However, in the longer-term, vehicle-to-grid applications may enable plug-in vehicles to export electricity back to the grid, although this is expected to be some way off.

The central measure to regulate or incentivise recharging at specific times will be new consumer energy packages and tariffs which promote recharging at the most optimal electricity price for the day. This will help reduce the operating costs of plug-in vehicles and may also enable large fleets to agree terms with energy providers where there is a mutual benefit in specific tariffs. In addition to advancing plug-in vehicle adoption, new ways of supplying electricity and associated product offerings could represent an entrepreneurial opportunity for Scottish companies.

7.4.12 As other technologies emerge and become credible, we will promote them. For example, we have identified projects at key locations

that involve LNG (liquid natural gas), inductive charging technology for fleet vehicles, and hydrogen to help tackle emissions from HGVs and public service vehicles.

7.4.13 The **E-cosse Partnership**, initiated by Transport Scotland and WWF Scotland, is a collaboration involving industry, government and other key stakeholders to advance the adoption of EVs in Scotland. Its approach acknowledges that, whilst government can put in place relevant policy frameworks, stakeholder support is essential. For example, and as already noted, industry has a critical role through technology development on batteries and their costs, while manufacturers are expected to develop alternative EV ownership or leasing models for consumers.

7.4.14 Through the work of the E-cosse partnership, we'll be publishing an **Electric Vehicle Roadmap for Scotland** later in 2013. This will set out the actions we, and partners, will take to achieve our ambition of EVs becoming an increasingly mainstream option for drivers. Other elements of E-cosse comprise:

- its Strategic Board, a forum of leaders from government, industry and other stakeholders. Chaired by the Minister for Transport and Veterans and co-chaired by Gordon McGregor, Energy and Environment Director at Scottish Power, it first met in October 2012; and
- Readiness initiatives, which will establish a portfolio of projects to advance EV adoption and implement the recommendations of the roadmap.

Buses

7.4.15 Buses account for 6% of Scotland's surface transport emissions. Our **Scottish Green Bus Fund**, launched in 2010, is helping our bus industry invest in the latest emission reducing technology and demonstrates our commitment to its future.²¹⁰ Our support targets the price difference between a LCV bus and its diesel equivalent. Our aims are to improve air quality, accessibility and encourage modal shift.

7.4.16 A market penetration of 50% **low carbon buses** by 2027 is thought to be achievable, provided the technology improvements continue to remove the price differential between LCVs and diesel vehicles. Towards the end of this period, LCVs are expected to become cost competitive with

²¹⁰ Scottish Green Bus Fund: www.transportscotland.gov.uk/public-transport/Buses/Bus-Fund

diesel vehicles. This transformation is an important opportunity for the Scottish bus manufacturing sector, led by Alexander Dennis of Falkirk.

7.4.17 Following a revision in the **Bus Service Operators Grant** methodology, grants to operators to support the network and keep fares down are based on distance rather than fuel consumption.²¹¹ This increases incentives for fuel efficiency and thus rewards environmentally efficient operations, as well as supporting the extent of the bus network. LCVs receive double the standard rate. Further, local authority actions around permitted vehicle types in air quality zones could further encourage low carbon transformation.²¹²

7.4.18 We are supporting hydrogen pilot projects and, as outlined below, will continue to seek further opportunities in this area.

Hydrogen Buses

The Aberdeen Hydrogen project, led by Aberdeen City Council and SSE, will see ten hydrogen buses operate on routes within central Aberdeen. This will be the largest fleet of hydrogen buses in Europe. They should be on First and Stagecoach bus routes by 2014 and will be refuelled at Scotland's first large hydrogen refuelling station, which will also be able to fuel hydrogen powered cars.

In the second phase of the project, SSE will develop a whole hydrogen system, which will harness wind energy to produce and store hydrogen, which can then be used to fuel vehicles and other uses such as generating electricity at times of peak demand.

The Scottish Government and Scottish Enterprise have each committed up to £1.65 million to support the project, which has a total budget of £22.5 million. The project has also received funding from the European Commission, the UK Technology Strategy Board and NESTRANS. Other partners include Aberdeen Renewable Energy Group, Ballard, BOC/Linde, Element Energy, Scotia Gas Networks and Van Hool.

²¹¹ Transport Scotland, Bus Service Operators Grant: www.transportscotland.gov.uk/public-transport/Buses/bus-service-operators-grant

²¹² The Scottish Government, Air Quality: www.scotland.gov.uk/Topics/Environment/waste-and-pollution/Pollution-1/16215

Maritime transport

7.4.19 While emissions from ferries are relatively small, it is important to drive them down. Subject to capital availability, our **Ferries Plan** published in 2012, sets out a major programme of vessel investment, including fuel efficiency improvements, from 2015.²¹³ We are considering the scope for more efficient powering of vessels while they in port through **connection to shore-side power sources**, and the use of port sites for renewable power generation.

7.4.20 We are also working with operators and the port sector on the environmental impact of maritime transport. This work includes emissions reduction from improved vessel design, **hybrid diesel-electric engines** (especially for ferries) and use of other alternative fuels, and **improved fleet management**. Improvements to the efficiency of the subsidised fleet as a whole are dependent upon the pace of vessel replacement.

7.4.21 Over the period 2027-2050, we expect many new low-emission ferries to be introduced. We are currently providing over £20 million to our asset-owning company, Caledonian Maritime Assets Ltd (CMAL), for the construction of two hybrid ferries, which will be equipped with both conventional diesel engines and batteries, which will be charged overnight from the grid.²¹⁴

7.4.22 **Liquid Natural Gas** may also contribute to maritime emissions abatement, with potential usage for one or perhaps two generations of vessels as part of the transition to the low carbon ferries.

7.4.23 We also support efforts for an international agreement on carbon emissions from shipping.

Aviation

7.4.24 The EU is responsible for the main policy lever for addressing **aviation** emissions, through the EU ETS, under which emissions from both domestic and international aviation are capped. In 2012, emissions were capped at 97% of average annual emissions from 2004–2006, and from 2013–2020 they will be capped at 95%.

²¹³ Transport Scotland, Ferries Plan: www.transportscotland.gov.uk/strategy-and-research/publications-and-consultations/j254579-00.htm

²¹⁴ Caledonian Maritime Assets Ltd: www.cmassets.co.uk/en/home.html

7.4.25 In support of an agreed international position on aviation emissions, the European Commission has instigated a 'stop the clock' proposal, the effect of which will be the exclusion, from the EU ETS, of flights into and out of Europe until September 2013. If sufficient progress is made as part of these international negotiations, this will continue post September. The International Civil Aviation Organisation is taking forward these negotiations while Scotland is feeding into the discussions through the UK's negotiators. European aviation emissions will continue to be included in the scheme for domestic flights and flights to and from European nations.

7.4.26 We endorse the on-going aviation **Clean Sky** partnership between the European Commission and industry which, with a grant budget of some €1.6 billion, will speed up technological advance.²¹⁵ Since June 2011, biofuels have been used on a number of commercial flights and have potential to deliver a step-change in the environmental performance of aviation.

Package 2 - Road network efficiencies

7.4.27 We will complement our work on promoting LCVs with Scottish road network efficiency initiatives, such as congestion management and efficient driving.

7.4.28 Our **Intelligent Transport Systems (ITS)** and the further deployment of **average speed cameras on trunk roads** (on sections of the network where they are likely to have an impact) will encourage driving at more efficient speeds.²¹⁶ The most efficient driving speed for cars varies but, in general, efficiency tends to decrease at speeds above 50 mph. ITS tools include variable speed limits, variable message signs, ramp metering and targeted use of the hard shoulder as an additional 'managed lane' for priority vehicles. Smoother traffic flows can also result in a reduced emissions and fuel consumption.

Package 3 - Sustainable communities

7.4.29 The **sustainable communities** package aims to help people understand their options and use more carbon friendly modes of travel through travel planning, walking and cycling, and the use of car clubs.

²¹⁵ Clean Sky partnership: www.cleansky.eu/

²¹⁶ Transport Scotland. Intelligent Transport Systems : www.transportscotland.gov.uk/road/technology/intelligent-transport-systems

7.4.30 By the 2020s, the concept of a sustainable community should be more of a reality than it is today, particularly given on-going work with local authorities, regional transport partnerships and other partners to develop approaches to providing and promoting sustainable transport options. The proportion of people commuting to work each day could be lower as a consequence of both digital technologies and low carbon behaviours and values.

7.4.31 We, with partners, will continue to develop community-based travel planning strategies in light of the learning from the joint £15 million *Smarter Choices Smarter Places (SCSP)* sustainable transport demonstration programme, as well as from other similar initiatives. The SCSP ran in seven local areas between 2008 and 2012.²¹⁷ There is a significant role for local authorities in delivering both behaviour change and infrastructural improvements (e.g., traffic calming and local road re-design). In addition, advice on travel choices (including vehicles type) is available from the network of Energy Saving Scotland Advice Centres.²¹⁸

Smarter Choices Smarter Places (SCSP)

The SCSP work identified the importance of residents receiving common messages from multiple sources and often from people or agencies they trust. Effective two-way communication, and action on feedback from the community, ensures an appropriate balance between investment in supply and demand for travel, e.g. through travel planning work.

Involvement by local people and businesses in the delivery of programmes similar to those delivered in the SCSP areas is also essential for their sustainability. This is often achieved through building community support, to enable programmes to be responsive to local opportunities as they arise.

The findings from the programme's evaluation are being used to inform and determine the characteristics of future programmes to be led and supported by the Scottish Government and designed to promote modal shifts to public and active travel.

²¹⁷ Transport Scotland. Smarter Choices Smarter Places: www.transportscotland.gov.uk/roads/sustainable-transport/funding-for-projects/smarter-choices-smarter-places

²¹⁸ Changeworks, Energy Saving Scotland Advice Centres: <http://www.changeworks.org.uk/householders/essacs-landing-page/408/#householder>

7.4.32 Improvements in integrated public transport, such as smart ticketing, and park-and-ride facilities, will support further modal shift to bus²¹⁹ and rail²²⁰ and away from private car usage, particularly where complemented by local travel planning. Local authorities have key roles in establishing **Bus Quality Contracts** and **statutory bus partnerships** as on-going measures to attract new passengers by improved bus service delivery. We are working with the Bus Stakeholder Group to identify and tackle any barriers to wider take up of bus quality contracts and partnerships. **Integrated ticketing** and **smartcards** also have potential to increase public transport use, especially as connectivity steadily improves.

7.4.33 In addition, work by bus operators and local authorities on interactive information boards within bus stops, with real time information on services, will develop confidence in public transport. Hand-held devices such as smart phones, with access to similar information, offer the potential to limit time spent waiting for buses at stops – seen as one of the major costs of using public transport.

7.4.34 Our **Cycling Action Plan** sets out our plans for achieving our vision that by 2020, 10% of all journeys in Scotland will be taken by bike. This has been undergoing a recent re-refresh exercise with stakeholders to ensure it is as up-to-date and as effective as possible in the wake of delivery experience. A new version was published in June 2013.²²¹

7.4.35 Our active travel policy beyond 2020 will continue work to substitute cycling and walking for car journeys of up to 5 miles, with on-going work with stakeholders to deliver further infrastructure improvements and promote active travel for shorter journeys. Scottish Ministers' intention to develop a **National Walking Strategy** was announced in May 2012 and work is underway with stakeholders.²²²

7.4.36 We will also continue to work with partners to develop a Scotland-wide network of **car clubs**²²³ across Scotland. Around a dozen have been developed to date and more are in development as communities recognise the potential cost-savings and convenience from car sharing over car ownership. Car club vehicles are generally at the lower end of the emissions range for conventional vehicles, so car club journeys compare favourably in terms of average emissions. On average, Scottish car club vehicles are 29% more fuel efficient than the average car in the UK.

²¹⁹ Transport Scotland. Bus Policy: www.transportscotland.gov.uk/public-transport/Buses/Policy

²²⁰ Transport Scotland. Rail Policy: www.transportscotland.gov.uk/rail

²²¹ Transport Scotland, Cycling Action Plan for Scotland:
www.transportscotland.gov.uk/news/cycling-action-plan-scotland-relaunch.

²²² National Walking Strategy:
www.scotland.gov.uk/News/Releases/2012/05/walkingstrategy17052012

²²³ Car Clubs in Scotland: www.carplus.org.uk/our-work/car-clubs-in-scotland/

7.4.37 Car clubs also offer an opportunity to pilot the use of EVs in communities and this will be developed in the coming years. Car clubs should become self-sustaining over time given their financial attractiveness to members.

Package 4 - Business engagement on sustainable transport

7.4.38 Businesses and organisations are significant generators of travel, with 10% of average annual travel accounted for by business activity.²²⁴ Travel is a significant cost to businesses. This package of Scottish interventions includes the on-going roll-out of **fuel efficient driving**, **workplace travel planning** and **freight efficiencies**.^{225, 226}

7.4.39 Through the “ChooseAnotherWay” website hosted by Energy Saving Trust on behalf of Transport Scotland, we are supporting workplace travel-planning to identify alternatives to travel (through the use of technology) and lower-carbon alternatives, including promotion of alternatives to travel (smarter working).²²⁷ We are also researching the impacts of the **Worksmart** initiative and similar projects being undertaken by local authorities and other organisations to reduce work-related travel and lever significant financial benefits as well as carbon abatement, with a view to encouraging further behavioural change work.²²⁸

ChooseAnotherWay

The chooseanotherway.com website is a resource for organisations in Scotland wanting to reduce the costs and environmental impacts associated with how we work and travel. It is hosted by the Energy Saving Trust on our behalf, and was developed in partnership with the 2020 Climate Group.

Mobility and the way we travel to the workplace, to meet clients, to transport goods and as part of daily operations can be a significant cost, source of emissions and area of corporate and occupational risk for organisations. The approaches provided will help businesses and organisations identify cost effective strategies for tackling travel-related issues, unlock benefits and achieve greater business efficiency and resilience. The website also provides knowledge-sharing opportunities through a series of webinars.

²²⁴ This excluding commuting which accounts for a further 20% of annual individual travel.

²²⁵ Fuel Efficient Driving:

www.energysavingtrust.org.uk/scotland/Travel/Driving/Fuel-Efficient-Driver-training

²²⁶ Workplace Travel Planning: www.chooseanotherway.com/

²²⁷ Choose Another Way: www.chooseanotherway.com/index.php

²²⁸ Worksmart initiative: www.flexibility.co.uk/cases/Aberdeenshire-Council-Worksmart.htm

7.4.40 We are encouraging **fleet efficiency** improvements through promoting fuel-efficient driving practices (for cars, vans and HGVs), the application of vehicle telematics, by signposting opportunities for fleet conversion through green fleet reviews, and work to help organisations identify the opportunities for reducing grey fleet costs.

7.4.41 Telematics combine IT and communications networks to enable hauliers and fleet managers to monitor vehicle location, fuel efficiency, driver technique and traffic conditions. They enable congestion avoidance, improve driving practices and reduce mileage.

7.4.42 We will continue to work with the haulage sector on alternatives to road haulage (freight modal shift to rail and water) and to encourage more efficient freight vehicle usage (fuel efficient driving practices for HGVs and vans, fuels, encouraging load sharing and consolidation etc).^{229, 230}

Lower emission potential in Transport

7.4.43 In preparing RPP2, we have taken a practical ‘bottom-up’ approach, i.e. we have identified and considered individual measures, estimated their potential emissions reductions impacts, and built up a package of proposals and policies.

7.4.44 However, when considering emissions abatement potential over a long time-frame, such as the climate change targets out to 2027, there is also a need to draw on elements of ‘top-down’ modelling. In these cases, modelling work suggests areas of long-term emissions abatement potential in certain sectors but with a greater level of uncertainty about the means of delivery than for other policies and proposals in this report. For this reason, in this report we refer to these measures as ‘technical potential’ proposals.

7.4.45 In the case of transport, a range of models used to predict transport emissions suggests that there may be an additional technical emissions abatement potential of perhaps as much as 0.75 MtCO₂e by 2027. This potential reflects uncertainties in projections of traffic growth, and the scope to manage reductions in use of the road network in favour of public transport and active travel.

²²⁹ Transport Scotland. Freight Grants:
www.transportscotland.gov.uk/road/policy/freight/Freight-Grants

²³⁰ Transport Scotland:
www.transportscotland.gov.uk/road/policy/freight

7.4.46 These estimates are necessarily very preliminary and so remain ‘technical’ for the time being due to the uncertainties surrounding a number of central factors. The baseline forecast that far ahead relies on a number of variables that are currently relatively volatile, e.g. fuel prices, and traffic growth, the rate at which new technologies evolve and are adopted, and the current situation will have consequences for projections of road network use and travel modes. This baseline is then affected by the scale, speed, timing and success of the currently identified policies and proposals which adds further uncertainties.

7.4.47 The emissions abatement from these transport technical potential proposals has been factored in to the RPP2 calculations for the years 2025 - 2027. The profile of the estimated emissions abatement potential simply reflects the limitations of currently available data. In reality, any emissions savings are likely to build more gradually, over a longer period of time. As such, the most appropriate approach to this potential is to undertake more robust analysis and appraisal before reporting in more detail. This analysis is likely to be undertaken in a number of phases over the period out to the context of RPP3 with the first of these assessments, looking at current trends in travel patterns and modes in Scotland (“Car, rail and bus travel trends in Scotland, 1995 to 2010”), due for release in the very near future. Work to develop and refine these proposals will continue and it is our intention to set out more information in RPP3 about how this emissions abatement might be realised.

7.5 Supporting and enabling measures

7.5.1 **Scottish Planning Policy** influences the location, density and form of development to make access by public transport and active travel easier and reduce travel demand. It can also influence the accessibility of infrastructure for mobile phone technology, Wi-Fi and broadband.

7.5.2 Communities will benefit from the impacts of our **Digital Strategy** allowing more opportunities for dispersed tele-working from home and community facilities, potentially reducing commuting and associated traffic and public transport congestion.²³¹ Business and leisure travel emissions and costs should fall as more services, including shopping and public services, are accessed digitally.

²³¹ Scotland’s Digital Future: A Strategy for Scotland: www.scotland.gov.uk/Publications/2009/08/26141950/0

7.5.3 We are implementing a wide range of **infrastructure investment plans**, geared to support sustainable economic growth in Scotland, which will encourage modal shift to public transport and active travel. We are committed to Fastlink in Glasgow, supporting the Glasgow Subway modernisation and Borders Rail, and supporting the Edinburgh trams, as well as work linked to the Forth Replacement Crossing around Park & Ride and dedicated busways.

7.5.4 In 2012-13, we are investing over £1 billion in public transport and other sustainable transport options to maintain the network and encourage people out of their cars. In June 2012, we announced a £5 billion package of funding and investment in Scotland's railways between 2014 and 2019, including a commitment to further electrification of the rail network.

7.5.5 Although Scotland does not feature in the UK Department for Transport's plans for high speed rail, Scottish Ministers have agreed a programme of joint working with the UK Government for high speed rail between the North of England and Scotland.²³² These plans will be presented during 2015. Scotland's inclusion adds to the economic case for high speed rail in the UK. It will also encourage modal shift from the UK's busiest domestic aviation market, between Scotland's central belt and London. A three hour journey time would potentially capture two-thirds of the overall Scotland to London travel market, and deliver reductions in carbon emissions from modal shift from air to train.

7.5.6 The Scottish Government is focused on delivering emissions reductions across the whole country. Transport Scotland has joined with SEPA to form the Scottish Transport Emissions Partnership (STEP).²³³ This group will develop a strategic approach to practical actions that can help manage poor air quality in Scotland. STEP aims to seek and share technical ideas and solutions to both address existing Air Quality Management Areas (AQMAS) and prevent further AQMAS from being declared.

²³² Department for Transport. High Speed Rail: <http://highspeedrail.dft.gov.uk/>

²³³ Scottish Transport Emissions Partnership:

www.scottishairquality.co.uk/documents/reports/4_Scottish_AQD_and_Website_Annual_Seminar_18_March_2013_STEP_Presentation.pdf

7.6 Costs and benefits

7.6.1 The costs of the interventions described above are largely derived from the MTCCI report on which our RPP1 analysis was founded.²³⁴ We have built on the work using updates from additional publications, including the CCC's Fourth Carbon Budget report.²³⁵

7.6.2 A significant proportion of the up-front funding required to implement many of these policies is likely to fall to the public sector, particularly through funding cost-gaps to stimulate the uptake of new technologies in the early years, or to support behavioural change work through the delivery of public-good type infrastructure (i.e., from which revenue streams cannot readily be generated in practice) such as cycle paths, or ITS for major roads.

7.6.3 Over time, individuals and businesses will be encouraged to invest in low carbon transport themselves through movements in relative prices for higher carbon alternatives. Proactive investment by the supply chain would also be sought to pump-prime the commercial transitions envisaged as the LCV agenda takes off. However, in general, the measures described here should bring financial benefits greater than their costs. Fuel efficient driving will bring fuel-cost savings for households and businesses, as well as a strong possibility of fewer traffic accidents. Modal shift to active travel should also provide financial savings to individuals. Car club membership can reduce the requirement for car ownership, while offering households and organisations access to lower cost car usage.

7.6.4 On top of the financial benefits, most of the policies and proposals will bring additional benefits such as improved health, improved air quality, less congestion and noise pollution, and enhanced biodiversity. Overall, the cumulative effect of our four packages will be to deliver a transport infrastructure that reduces greenhouse gases and other emissions, reducing the volume of substances in the outdoor air that are harmful to health and the natural environment.

7.6.5 The decarbonisation agenda offers a real opportunity to re-focus Scotland's expertise in high value manufacturing into a new, dynamic and rapidly growing **global market for low carbon vehicles and vessels**. Although Scotland has no major car manufacturing industry, Scottish companies have capability in niche vehicle manufacturing and are bringing

²³⁴ Mitigating Transport's Climate Change Impacts:
www.scotland.gov.uk/Publications/2009/08/26141950/0

²³⁵ Committee on Climate Change. Fourth Carbon Budget:
www.theccc.org.uk/publication/the-fourth-carbon-budget-reducing-emissions-through-the-2020s-2/

prototypes to market. These companies include Allied Vehicles Ltd (EVs),²³⁶ Axeon (lithium-ion batteries)²³⁷ and Alexander Dennis Ltd (hybrid buses).²³⁸ The uptake of EVs will also support opportunities related to large scale transition to renewable energy generation. In addition, the £20 million contract for new hybrid ferries has been awarded to the Ferguson Group.²³⁹

7.6.6 Taking account of forecast costs for petrol and diesel, and the relative fuel efficiencies of conventional and electric cars, EVs should, over time, become significantly cheaper to run than conventional vehicles. Potentially, this could stimulate increased vehicle usage, thus congestion, which would need to be tackled through traffic management.

7.6.7 The provision of additional cycling and walking infrastructure can be labour-intensive relative to larger infrastructure projects, thus creating construction work for locally-based contractors. A growth in cycling could also mean an increase in jobs in bike shops, supply chains and leisure and tourism outlets, as well as in relation to cycle-training provision and promotion (though logically with a consequent negative impact on the vehicle sector). Increased participation in active travel, in addition to car and lift sharing, can also help alleviate transport poverty issues by widening the low-cost low carbon travel options available.

²³⁶ Allied Vehicles Ltd: www.alliedelectric.co.uk

²³⁷ Axeon: www.axeon.com

²³⁸ Alexander Dennis Ltd: www.alexander-dennis.com/alexander-dennis-limited.php

²³⁹ Ferguson Group: www.fergusongroup.co.uk/shipbuilding/profile.aspx

Table 7.1: Highlights of progress since publication of RPP1

Transport	Summary
Policies	
<p>EU Directives The adoption of EU Directives relating to cars (2009) and vans (2011) established mandatory CO₂e emissions reduction targets to improve the fuel economy of new vehicles by 2020. Phased emissions reductions targets are introduced from 2012 (cars) and 2014 (vans) respectively; The adoption of the EU Biofuels Directive (2009) increases the proportion of fuel used in transport that must be derived from renewable sources to a minimum of 10% by 2020.</p>	<p>Actions Market-led adjustments to the supply of new vehicles in Scotland. Transposition of the European Biofuels Directive through the UK Renewables Transport Fuel Obligation.</p> <p>Outcomes On-going transition to lower emission vehicles through steady replacement of the existing fleet; increasing penetration of biofuels into the transport fuel supply mix.</p>
Proposals	
<p>Eco-driving Eco-driving delivers driving techniques leading to average fuel savings of 5-10%. This proposal is to encourage market demand for eco-driving training from car drivers and its delivery.</p>	<p>Actions The Scottish Government has provided grant funding to the Energy Saving Trust (EST) to deliver training in fuel efficient driving techniques to businesses Scotland-wide.</p> <p>Outcomes In 2012-13, around 3,000 drivers, including 1,000 high-mileage drivers, benefited from subsidised training. Support for fuel-efficient driver training will continue in 2013-14.</p>
<p>Speed limits Stricter enforcement of the existing 70 mph limit on dual carriageways and motorways.</p>	<p>Actions Actions taken forward under Intelligent Transport Systems (ITS).</p> <p>Outcomes Outcomes listed under Intelligent Transport Systems (ITS).</p>

<p>Low carbon vehicles and infrastructure</p> <p>Measures to support the procurement of low carbon vehicles and their supportive infrastructure.</p>	<p>Actions</p> <p>Over the past two years, the Scottish Government has invested over £8 million in EVs and associated infrastructure in Scotland. The 'E-cosse' Partnership, a collaboration between government, industry, WWF Scotland and other key stakeholders has been established and will produce a roadmap in Summer 2013 setting out the process for advancing the wholesale adoption of EVs in Scotland. E-cosse aims to capitalise on the Scotland's potential to be an EV pioneer, maximizing the economic, environmental and social benefits of EVs as an integral part of a sustainable transport system and a smart energy grid.</p> <p>We have also supported innovative projects such as Aberdeen City Council's hydrogen fuel cell bus trial, which show the potential of other advanced low carbon vehicle technologies.</p> <p>Outcomes</p> <p>Our funding over the last two years has contributed to the purchase of around 270 public sector low carbon vehicles and the installation of approximately 300 charging points. We aim to install a further 200 charging points in this financial year in households, in workplaces and in publicly accessible locations</p>
<p>Freight efficiencies</p> <p>Measures aimed at improving freight efficiency through technological, purchasing and operational changes in the fleets of freight vans and HGVs.</p>	<p>Actions</p> <p>Subsidised fuel efficient driver training was initially provided by SG to establish commercial demand for this training. Freight Best Practice advice with supporting case studies is provided on the Transport Scotland website.²⁴⁰ The advice includes a carbon toolkit developed with industry input.</p> <p>Outcomes</p> <p>Increased industry engagement with emissions reduction agenda. The Freight Transport Association has a Logistics Carbon Reduction Scheme, which aims to reduce emissions by 8% by 2015 through improved efficiency and some modal shift to rail, while the Road Haulage Association has produced guidance on carbon reduction measures.</p>

²⁴⁰ Transport Scotland: www.transportscotland.gov.uk/road/policy/freight/best-practice

<p>Van efficiencies</p>	<p>Actions Actions taken forward under Freight Efficiencies.</p> <p>Outcomes Outcomes taken forward under Freight Efficiencies.</p>
<p>Intelligent Transport Systems (ITS) To use ITS to reduce the volume or increase the efficiency of traffic flows on the trunk road network.</p>	<p>Actions Provision of variable speed limits, variable message signs, ramp metering, speed enforcement, and targeted use of the hard shoulder as an additional 'managed lane' for priority vehicles, as appropriate.</p> <p>Outcomes Various components of ITS have been included as part of the M74 completion (£445 million) and M80 Stepps to Haggs (£320 million) major infrastructure projects. In December 2012 ITS was introduced on the M90 in Fife, with a dedicated bus lane and variable speed limits used during periods of congestion to smooth traffic flow, cut jams and make journey times more reliable. In February 2013 ITS was also introduced at junction 1A of the M9.</p>
<p>Maritime To work with domestic ferry operators to achieve emissions reductions of up to 20%.</p>	<p>Actions We are supporting the next generation of vessels, including lower-emissions hybrid technologies.</p> <p>Outcomes We are funding the construction by Fergusons of Port Glasgow of two new hybrid ferries at a cost of £20 million.</p>
<p>Travel planning Provide advice and information on sustainable transport options as an alternative to single-occupancy car journeys, tailored to individual circumstances</p>	<p>Actions Personalised travel planning has been provided to 50,000 households through the Smarter Choices Smarter Places (SCSP) programme, under which supported a range of sustainable transport initiatives in the participating communities. Next steps will be developed with stakeholders in the wake of the SCSP evaluation.</p> <p>Outcomes An evaluation of the programme was published in April 2013. The evaluation reported that the programme has encouraged more people in their areas to use active forms of travel. These changes have usually been more than in comparable areas without the same types of interventions.</p>

<p>Cycling and walking infrastructure</p> <p>The Cycling Action Plan (CAPS) for Scotland published in 2010 sets the framework for a tenfold increase in the proportion of journeys made by bicycle by 2020. This proposal also includes options to encourage people to walk shorter journeys more often. The proposal seeks to increase the proportion of journeys by active travel to 20%.</p>	<p>Actions</p> <p>On-going work to implement the CAPS, including promotion of cycling across schools, communities and workplaces, and investment in infrastructure improvements across Scotland (with SG support of more than £50 million over three years. A refresh of the Cycling Action Plan for Scotland has been undertaken with stakeholders to ensure it is as up-to-date and effective as possible going forward.</p> <p>Outcomes</p> <p>The latest (2011) figure for the number of trips undertaken on the National Cycle Network (NCN) is 44 million. The proportion of children receiving on-road 'Bikeability Scotland' cycle training has increased to 31.7% of the P6-7 cohort. We have urged local authorities to not only meet Cycling Scotland's target of 40% by 2015 but to exceed it. Local cyclist-awareness 'Give Me Cycle Space' campaigns aimed at drivers have been delivered in fifteen local authority areas covering over 130 schools since May 2012, with evaluation results suggesting a positive impact on cycling interest and participation. Scotland's first cycling/rail hub was opened at Stirling Railway station in May 2013, providing information and advice to cyclists.</p>
<p>Car clubs</p> <p>To create car clubs in towns with populations less than 25,000 to reduce the need for car ownership</p>	<p>Actions</p> <p>A number of communities are being financially supported to test the feasibility of establishing car clubs in their areas. Those locations which prove to be suitable for car club development are being given further support to establish a functioning car club operation, which should become self-financing within 2-3 years</p> <p>Outcomes</p> <p>Fourteen car clubs have so far received support from the Developing Car Clubs in Scotland programme, including in Aberdeen, Dundee and Dumfries which launched in 2012.</p>

<p>Buses and taxis</p> <p>Extension of the Green Bus Fund to encourage operators and local authorities to invest in new low carbon vehicle technology. Work with the bus operators through CPT and the Greener Journeys programme to encourage increased bus patronage. Funding for local authorities to encourage travel by public transport through innovative travel exchange points, information provision, and integrated travel.</p>	<p>Actions</p> <p>Through the Green Bus Fund, the Scottish Government has provided £7.7 million of grant funding to support the purchase of low carbon buses by a variety of bus operators across Scotland.</p> <p>Outcomes</p> <p>Since 2010 over 90 buses have been purchased through this scheme. Each new bus is expected to produce 30% less emissions and require 60% less fuel than a diesel bus, to deliver an average emissions reduction of around 21 tCO₂e per year or 300 tCO₂e over its life-cycle.</p>
<p>Freight modal shift-</p> <p>Provide further incentives to encourage modal shift of freight to rail or water as appropriate.</p>	<p>Actions</p> <p>We operate four freight grant schemes to encourage the transfer of freight from road to rail or water, where the road option is cheaper.</p> <p>We are developing a rail freight policy framework that aims to encourage increased modal shift to rail for freight, from less sustainable modes.</p> <p>Outcomes</p> <p>Freight mode shift grant funded projects have removed over 52 million lorry miles from Scotland's roads since 2007 by transferring freight from road to rail and water.</p>
<p>Community hubs</p> <p>To further reduce the need to travel through the provision of shared remote working facilities in settlements with populations less than 10,000.</p>	<p>Actions</p> <p>Emerging findings of activities undertaken since RPP1 indicated greater emissions abatement potential to be achieved through pursuit of other measures especially workplace travel planning and further investigation of smarter working approaches and possibilities.</p> <p>Outcomes</p> <p>On-going work around alternatives to travel with partners such as the 2020 Climate Group and public sector organisations.</p>

Table 7.2: Summary of Transport policies and proposals

Transport	EU, UK or Scottish	Annual Abatement (KtCO ₂ e) 2020	Annual Abatement (KtCO ₂ e) 2027	Earliest start date
Policies				
Decarbonising Vehicles (EU Directives)				
EU legislation on new vehicle emissions standards and on the proportion of transport fuel that must be comprised of biofuels.	EU	1,243	1,727	On-going
Proposals				
Decarbonising Vehicles				
Programme of measures designed to increase the adoption of electric vehicles, low carbon buses, hybrid ferries and encourage the use of biofuels across the transport sector.	Scottish	282	798	On-going but scalable
Sustainable Communities				
Promote sustainable and active transport through the provision of integrated public transport, travel planning to promote sustainable travel choices, developing the cycling and walking infrastructure and encouraging the expansion of car clubs to reduce car ownership.	Scottish	139	277	On-going but scalable
Business Efficiencies				
A range of measures centred around engaging with businesses including providing support for workplace travel-planning and advice to encourage fleet efficiency improvements including the provision of fuel efficient driver training.	Scottish	121	462	On-going but scalable

<p>Network Efficiencies</p> <p>For appropriate sections of the trunk road network, applying Intelligent Transport System (ITS) tools and the use of average speed cameras to promote fuel efficient driving.</p>	<p>Scottish</p>	<p>36</p>	<p>32</p>	<p>On-going but scalable</p>
<p>Lower Emission Potential in Transport</p> <p>Potential additional abatement reflecting current uncertainties in projections of traffic growth, and the possible future scope to manage reductions in use of the road network in favour of public transport and active travel</p>	<p>Scottish</p>	<p>0</p>	<p>750</p>	<p>2025</p>