STRATEGIC TRANSPORT PROJECTS REVIEW

PROTECTING OUR CLIMATE AND IMPROVING LIVES

Appendix I: Recommendation Appraisal Summary Tables

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1. Detailed Appraisal Summary

An 'Appendix I: Recommendation Appraisal Summary Tables (ASTs) Explanatory Note' accompanies this AST.

1.1. Recommendation 28 – Zero emission vehicles and infrastructure transition

Recommendation Description

This recommendation focuses on options which aim to support the shift to a zero-emission road transport network, through technological change. Delivering this shift is an essential element in achieving the reduction in CO_2 emissions from road transport required to meet the Scottish Government's net zero target[i].

This recommendation includes specific measures to support the rapid decarbonisation of two types of vehicle, which have overlapping but distinct requirements:

- **Battery Electric Vehicles (BEVs)** – Requiring access to electric charging
- **Fuel Cell Electric Vehicles (FCEVs)** – Requiring access to hydrogen

The options within this recommendation which support the shift to BEVs look to build on existing charging infrastructure, with over 3,000 publicly accessible charging points for light vehicles already operational across Scotland. The availability of charging points varies between rural and urban areas and so options would look to address gaps in the current charging infrastructure and guarantee that any future charging infrastructure is fit for purpose. This would be both in terms of the provision of infrastructure and in the operational model for the installation of that infrastructure, ensuring that the environment is in place for a transition to private investment to enable expansion of public charging networks. This would be a necessary step, as the use of electric vehicles and, consequently, the demand for charging points, is anticipated to grow. Whilst there would be an increasing role for the private sector in the zero-carbon market, the options considered for public sector involvement within this recommendation include:

- Installation of electric charging infrastructure at key strategic locations on the road network;
- Encouraging the use of private/commercial zero emissions vehicles by;
- Supporting zero emissions car share schemes
- Encouraging private sector fleet transition
- Zero emission vehicle purchase or leasing incentives
- Encouraging zero emissions Taxi uptake

At present, the unclear technological pathway is a key barrier to rapid adoption of hydrogen powered vehicles. Development and deployment of appropriate technologies for hydrogen infrastructure, followed by rapid replacement of vehicles poses a significant challenge. However, Scotland is well positioned to develop and implement a strategic hydrogen network due to its abundant renewable energy resources. Whilst there would be a significant role for the private sector in making the transition to hydrogen powered vehicles, the options considered for public sector involvement within this recommendation

include:

- Developing a better understanding of the technological pathway to universal uptake of FCEVs;
- Funding for zero emissions innovation projects;
- Financial incentives to encourage the use of FCEVs; and
- Development of a strategic hydrogen network (noting overlap with bus and freight decarbonisation).

Managing the funding transition from public to private for future development of zero emission vehicle charging and refuelling networks is a key element of transition for all vehicles. Developing a zero-emission pathway incorporating both electric and hydrogen vehicles is a vital component in ensuring that the entire transport system can be decarbonised. Some elements contained within this AST that would help to achieve the Scottish Government's net zero-target are further developed within the Bus, Freight and Ferry decarbonisation mode specific ASTs.

1.2. Relevance

Relevant to all of Scotland

The Climate Change Act passed by the Scottish Parliament aims to reduce CO_2 emissions to 90% of 1990 levels by 2040. In 2019, transport was the single largest source of greenhouse gas (GHG) emissions in Scotland, contributing 12.0 MtCO2e and accounting for approximately 25% of all GHGs[ii]. Of these, cars accounted for 39% and goods vehicles contributed 25%[iii].

The potential reductions in vehicle emissions as a result of improvements in engine efficiency over the most recent decade has been offset by an increase in vehicle kilometres travelled and a trend towards sales of larger vehicles[iv]. In the past four decades, car traffic on major roads in Scotland has tripled, with 2019 recording 48.7 billion vehicle kilometres versus 9,300 million kilometres travelled in 1975 - the highest ever number of vehicle kilometres travelled on all roads[v].

It is clear that meeting the reductions targets set out in the Climate Change Act will require reduction in vehicle kilometres, reduced demand for road transport and rapid transition to zero emission passenger and freight vehicles through technological change.

The key driver for this change is the commitment made in the Update to Climate Change Plan 2018 - 2032 to phase out the need for new petrol and diesel cars and vans by 2030[vi]. Achieving this will require the delivery of the key infrastructure necessary to support the transition to zero emission vehicles.

Electric vehicle drivers in Scotland already benefit from one of Europe's most comprehensive charging networks, with almost 3000 publicly accessible charging points for light vehicles. Whilst on average, there is a public charging point every 4.5km, there are large areas of the country, particularly in rural settings, where the distance to the nearest publicly accessible charging point is much further, at between 32 and 96kms[vii]. The lack of charging infrastructure in rural settings is partially driven by the lack of a sustainable commercial model for installation, a problem which would also manifest in those areas showing lower EV uptake. Installation in such areas has traditionally been

undertaken by local government, due to the lack of revenue generation potential, but it would be necessary for future installation models to bridge this gap between local government and commercial installation.

Specific examples of the increasing use of zero emission vehicles exist across the country. Dundee is regarded as Scotland's leading city in the adoption, promotion and operation of electric vehicles, being awarded the title of most visionary city in Europe for electric vehicles, in 2018[viii]and has led the way in the implementation of larger electric vehicles, such as refuse vehicles. The PACE project in South Lanarkshire demonstrated that electricity distribution network operators (DNOs) working in partnership with local communities are able to deliver the necessary public charging infrastructure, in response to local demand[ix].

The development of hydrogen vehicles has also progressed, with Aberdeen being one of Europe's pioneering cities, opening two publicly accessible hydrogen fuelling stations and operating one of the largest and most varied fleets of hydrogen vehicles in Europe, including buses, cars vans, road sweepers and refuge trucks[x]. Hydrogen is also seen as a potential fuel for other modes of travel, such as ferries and trains. These existing exemplars show that Scotland has the potential to achieve the deep decarbonisation required but existing schemes and projects may need to be replicated on an equitable and sustainable basis across the country.

1.3. Estimated Cost

£501 million – 1 billion Capital

A key option within this recommendation is to develop a better understanding of the technological pathway to universal uptake of hydrogen as a power source. Given that this work is yet to be undertaken, the requirements for the development and delivery of a hydrogen supply and distribution network capable of meeting the needs of these vehicles are yet to be fully determined. Cost estimates cannot therefore be provided with any certainty at this point.

Estimated costs for the transition to BEVs can be projected based on the delivery rate of existing funding streams for BEV infrastructure. However, upscaling this at the rate required to achieve the net-zero target, is uncertain, as growth is bound by external factors such as vehicle availability and the upgrading of grid connections.

Current rates of Scottish Government investment in zero emissions vehicle uptake and infrastructure give an indication of how rapidly future funding could grow. Over the last ten years – Scottish Government grant funding has provided:

- over £165 million of interest free loans to support the purchase of over 6100 vehicles.
- over £5.3 million in grants to support the installation of over 17,000 home charge points across Scotland.
- over £10 million to deliver 1500 charge points to businesses.
- £50 million investment over the same period to establish 2,200 public charge points – with a new £60 million Infrastructure scheme launched in January 2022.
- Over £60 million to introduce 3450 vehicles into the public sector fleet.
- £7 million to support zero emission mobility across two new innovation projects[xi].

The rate of growth in investment needed to maintain pace with the required level of uptake in zero emissions vehicles can be illustrated using charge point installation as an example. The Scottish Futures Trust project that annual investment of around £100m would be required to meet the 2035 net zero target, based on an assumed annual rate of over 4,000 new public chargepoints, with an average cost of £15,000 to £20,000, in order to service demand for private cars and small vans[xii]. These estimates do not include operation and maintenance costs.

The installation of domestic charge points is also likely to increase steeply over the coming ten-year period as electric vehicles gain widespread adoption. Based on current use of the grant scheme, this would lead to an eventual cost of £100 million+ over the period as every household acquiring an EV, with the capacity to install a charge point, applies for the funding to do so.

Therefore, we may assume that, cumulatively, over a ten-year transition period, the total cost could be in the order of £1 billion. It must be noted, however, that there are a variety of public and private investment models for the delivery of this level of investment and it is unlikely – and undesirable – that this full cost is borne by the public purse. The estimates quoted in this assessment therefore represent a 'worst case scenario' whereby private investment is not leveraged to any significant degree.

1.4. Position in Sustainable Investment Hierarchy

Targeted Infrastructure Improvements

The recommendation would contribute to 5 of the 12 NTS2 outcomes, as follows:

- Help deliver our net zero target;
- Adapt to the effects of climate change;
- Promote cleaner, greener choices;
- Use beneficial innovation; and
- Help make our communities great places to live.

1.5. Summary Rationale

Summary of Appraisal

	TPO					STAG					SIA				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Low Scenario	+++	0	0	0	0	++	+++	0	+	-	++	0	+	+	-
High Scenario	+++	0	0	0	0	++	+++	0	+	-	++	0	+	+	-

This recommendation is focused on enabling the switch to zero emission vehicles to help achieve Scottish Government targets. The recommendation therefore performs strongly against TPO1, as it would enable a reduction in transport-based emissions, and therefore contribute to net-zero. It should be noted that this is dependent on the production of clean energy but given Scotland's high renewable energy potential this is a low risk.

In addition, this would lead to broader benefits in health through the reduction of pollution and, potentially benefiting the green economy.

However, whilst the recommendation does provide wider a broadly equitable benefit to society in terms of air pollution, the most immediate, tangible benefits to the public are likely to be unequally distributed due to the likely income disparity in EV uptake among car owners.

2. Context

2.1. Problems and Opportunities

This recommendation could help to address the following problem and opportunity themes identified in the National Case for Change:

Relevant Problem & Opportunity Themes Identified in National Case for Change

- **Global Climate Emergency:** The Scottish Parliament committed to an ambitious target of net zero emissions by 2045 and transport needs to play its part. Transport is currently Scotland's largest sectoral emitter, responsible for 35.6% of Scotland's total greenhouse gas emissions in 2018[xiii]. Our transport system needs to minimise the future impacts of transport on our climate.
- **Air Quality:** transport, and road transport in particular, remains a significant contributor to poor air quality. Air pollution increases the risks of diseases such as asthma, respiratory and heart disease, particularly for those who are more vulnerable. Air quality is often worse in areas of deprivation and is a health inequality issue.
- **Changing Travel Behaviour:** changing people's travel behaviour to use more sustainable modes will have a positive impact on the environment, as well as health and wellbeing.

2.2. Interdependencies

This recommendation has potential overlap with other STPR2 recommendations and would also complement other areas of Scottish Government activity.

Other STPR2 Recommendations

Reference numbers for each recommendation are given to enable cross-referencing with those provided in the summary and technical reports.

- Supporting integrated journeys at ferry terminals (18);
- Framework for the delivery of mobility hubs (22);
- Decarbonisation of the bus network (26);
- Behavioural change and modal shift for freight (27); and
- Strategy for improving rest and welfare facilities for hauliers (36).

Other areas of Scottish Government activity

- Climate Change Plan 2018-32 Update[xiv];
- Low Emission Zones[xv];
- Scotland's Draft Hydrogen Action Plan[xvi]
- Emerging Energy Technologies Fund[xvii];
- Scottish Energy Strategy[xviii]
- Transport Mission Zero[xix].

3. Appraisal

This section provides an assessment of the recommendation against:

- STPR2 Transport Planning Objectives (TPOs)
- STAG criteria
- Deliverability criteria
- Statutory Impact Assessment criteria.

The seven-point assessment scale has been used to indicate the impact of the recommendation when considered under the 'Low' and 'High' Transport Behaviour Scenarios (which are described in Appendix F of the Technical Report).

3.1. Transport Planning Objectives

1. A sustainable strategic transport system that contributes significantly to the Scottish Government's net-zero emissions target

Low Scenario	High Scenario
+++	+++

Each of the different options within this recommendation serve to reduce the carbon footprint of the road network across Scotland, through either providing infrastructure to aid the use of zero emission transport or through directly encouraging the transition to zero carbon vehicles. Whilst the transition would not be immediate, leading to potential uncertainties over the timeframe over which the transition would occur, the final impact is certain to be a large net gain in reducing CO_2 emissions. Therefore, this recommendation is anticipated to have major positive impact against this objective under both the low and high travel behaviour variant scenarios. The impact is anticipated to be stronger in the high scenario because the greater the use of vehicles, the higher the potential for zero emission vehicles to mitigate the negative effects of vehicle use. It should be noted that this is dependent on the production of clean energy but given Scotland's high renewable energy potential this is a low risk.

Overall, this recommendation is expected to have a major positive impact against this objective in both the Low and High travel behaviour variant scenarios.

2. An inclusive strategic transport system that improves the affordability and accessibility of public transport.

Low Scenario	High Scenario
0	0

The options within this recommendation are either primarily concerned with the provision of charging infrastructure, or the direct transition of vehicles to zero emission vehicles. This would not directly affect the provision/utilisation of public transport as it is assumed that there would be a one-to-one replacement of vehicles. However, as the total cost of operating zero emissions vehicles lowers and becomes less than that of vehicles powered by internal combustion (due to the absence of fuel duty, long-term price of electricity and lower maintenance costs[xx]) private vehicles would begin to compete more strongly in economic terms against public transport modes (which may also benefit from the reduced cost of operating zero emissions vehicles but would retain existing fixed costs such as depots, stations or tracks) . Further assessment of this objective is also contained within the Decarbonisation of the Bus Network AST (26).

Overall, this recommendation is expected to have a neutral impact against this objective in both the Low and High travel behaviour variant scenarios.

3. A cohesive strategic transport system that enhances communities as places, supporting health and wellbeing.

Low Scenario	High Scenario
0	0

Health benefits from the options contained within this recommendation would be derived from the improvements in air quality brought about by eliminating exhaust emissions from use of internal combustion engines (ICE) vehicles. However, a large proportion of particulate matter from vehicle use does not arise from exhaust emissions. These 'non-exhaust emissions' come from brake, tyre and road wear and from the re-suspension of particles from the road surface by the physical effects of running traffic. These emissions are estimated to exceed the particulate emissions from the exhaust pipe[xxi]. Non-exhaust emissions can be affected by a variety of factors outside the influence of the options within this recommendation such as road surface, maintenance and climate[xxii].

A further positive impact would arise from the reduction in noise pollution brought about by widespread use of zero emissions vehicles. This would lead to a reduction in the number of people who could be adversely impacted by noise. However, some noise created by contact between the trye and surface would remain, and this would be greater at higher speeds[xxiii].

Options within this recommendation would not have any positive impact on active travel or the sense of place as they would replace existing vehicles and not encourage any more active journeys. Improper siting of charging infrastructure could also negatively impact the street environment for people walking, cycling or wheeling[xxiv].

On balance, this recommendation is expected to have a neutral impact against this objective in both the Low and High travel behaviour variant scenarios.

4. An integrated strategic transport system that contributes towards sustainable inclusive growth in Scotland.

Low Scenario	High Scenario
0	0

The options within this recommendation could positively influence this objective by providing infrastructure and incentives to encourage a transition to zero emission vehicles. This transition could lead to further opportunities in new labour markets, education, and training as people take advantage of the new green economy. However, due to the current purchase costs of zero emission vehicles, this would predominantly affect those on a higher income or with access to commercial finance. The socio-economic disparities between the traditional vehicle and alternatively fuelled vehicle owners would lessen in time as alterative fuelled vehicle ownership becomes common place, however it is unlikely to make travel by private car affordable to those who cannot currently afford it.

This recommendation is therefore expected to have a neutral impact against this objective in both the Low and High travel behaviour variant scenarios.

5. A reliable and resilient strategic transport system that is safe and secure for users.

Low Scenario	High Scenario
0	0

Whilst the individual elements of zero emission transport modes are reliable, it is unlikely to make the overall transport network more reliable or resilient as there are likely to be a similar level of distribution and safety related issues as there are with the current transport network.

The issue of resilience is also difficult to determine, as the transition to a new power source for transport may lead to benefits due to the ease of transmitting electricity whilst simultaneously encountering capacity issues.

Potential issues may occur when there is a mismatch between energy production and energy demand. However, EV batteries and hydrogen production have the potential to

solve this problem by providing a means of storing energy and discharging it during peak demand periods or emergencies.

his recommendation therefore is expected to have a neutral impact against this objective in both the Low and High travel behaviour variant scenarios.

3.2. STAG Criteria

1. Environment

Low Scenario	High Scenario
++	++

See Strategic Environmental Assessment (SEA) below.

This recommendation is expected to have a moderate positive impact against this criterion in both the Low and High travel behaviour variant scenarios.

2. Climate Change

Low Scenario	High Scenario
+++	+++

Decarbonisation of road transport would reduce greenhouse gas emissions caused by the existing vehicle fleet, which is crucial for supporting the Government's commitment to net zero by 2045.

While the impact on the vulnerability to effects of climate change and the potential to adapt to effects of climate change are expected to be neutral, this recommendation is still expected to have a major positive impact against this criterion in both the Low and High travel behaviour variant scenarios.

3. Health, Safety and Wellbeing

Low Scenario	High Scenario
0	0

Due to the like-for-like replacement of vehicles under options within this recommendation, it is not expected that there would be any impact on accidents or security. The potential danger from electric vehicles being "too quiet" has yet to convincingly emerge, with manufacturers also installing noise systems in electric vehicles. The overall safety aspects of alternatively fuelled vehicles are comparable to traditional ICE vehicles. There is no substantial identified risk from the infrastructure required to charge or refuel alternatively fuelled vehicles.

Health benefits would be derived from an incremental improvement in air quality and reduction in noise pollution as a result of the widespread adoption of zero emission vehicles. However, the like-for-like replacement of vehicles would not encourage any shift towards more healthy, active travel options and no additional road space would be freed up for public space or wellbeing infrastructure so the potential for positive impact is limited.

Due to the like-for-like replacement of vehicles under options within this recommendation, it is not expected that there would be any positive impacts on visual amenity and the potential for 'street clutter' caused by improper siting of charging infrastructure could adversely impact on the public realm.

Overall, this recommendation is expected to have a neutral impact against this criterion in both the Low and High travel behaviour variant scenarios.

4. Economy

Low Scenario	High Scenario
+	+

Due to the like-for-like replacement of vehicles under options within this recommendation, transport economic efficiency is unlikely to be significantly impacted. Longer wait times associated with charging as opposed to traditional fuelling have the potential to adversely affect transport economic efficiency for some BEV. However, this doesn't apply to 'back to base' operations or FCEV.

The implementation of the options within this recommendation are unlikely to have an impact on the economy from the perspective of transport as a growth enabler However the development of zero emission fuels, particularly hydrogen, could lead to new opportunities for a number of skilled workers from the oil and gas industry. The transition to 'greener' energy would bring an opportunity to redeploy highly skilled workers from oil and gas into a new equally high skilled role in a similar sector, potentially reducing the risk of significant job losses as the demand for fossil fuels begins to diminish. Jobs would also be created in the installation and maintenance of charging infrastructure. The degree to which the job losses in traditional energy sectors or in traditional garage services may be attributed to the specifics of the transition to zero emission fuels would determine the impact on this criterion.

Overall, this recommendation is expected to have a minor positive impact against this criterion in both the Low and High travel behaviour variant scenarios.

5. Equality and Accessibility

Low Scenario	High Scenario
-	-

It is assumed that options within this recommendation would give rise to a like-for-like replacement of ICE vehicles. However, for private cars, the potential for a lower total cost of ownership for zero emissions vehicles could lead to a long-term increase in their cost competitiveness over public transport. This could make public transport operation less viable.

Options within this recommendation are assumed to lead to a like-for-like replacement of vehicles and so would not have any positive impact on active travel coverage as no additional space would be freed for implementation of walking, cycling or wheeling infrastructure.

Though the options within this recommendation are assumed to give rise to an in-kind replacement of vehicles, people living in remote, or island communities could benefit from a wider coverage of charging infrastructure due to the wider distances typically covered and the generally lower density of public transport provision. The impact on these communities would therefore be broadly positive.

Women and younger people are less likely to have access to a vehicle or possess a driving licence. Vehicle ownership and possession of a driving licence also varies across different backgrounds and ethnicities. Options which enable use of vehicles as a primary mode of transport are therefore likely to disproportionately exclude these groups. As detailed below, the affordability implications of vehicle ownership could also lead to exclusion of lower income groups.

People on lower incomes are less likely to have access to a car[xxv] and risk being placed into transport poverty through 'forced car ownership'[xxvi]. While the cost of owning a traditional ICE vehicle is already beyond the financial reach of many, the capital cost of ownership for zero emission vehicles is currently even greater. The options considered within this recommendation are unlikely to enable vehicle ownership for those on lower incomes and are therefore likely to negatively impact on affordability.

Overall, the options within this recommendation are expected to have a minor negative impact against this criterion in both the Low and High travel behaviour variant scenarios.

3.3. Deliverability

1. Feasibility
For BEVs the technology required to achieve the goals of this recommendation is mature, with the main difficulties in aligning the charging, energy distribution and energy generation network to the demands of the new vehicle fleet. The fundamentals of the charging infrastructure are identical to those of ten years ago and would likely remain the same. Similarly, the EV technology contained within the vehicles themselves is a proven solution with steady, incremental improvements in battery technology driving increased capability. However, for FCEVs, the pathway to widespread adoption of either electricity or hydrogen as zero emission fuels is less certain, particularly if it requires the development of a parallel infrastructure.

2. Affordability
Uptake of electric vehicles would be in-part market driven and by the natural rate of fleet turnover. However, if driven by market forces alone, the transition to electric vehicles would not happen fast enough to meet emissions targets. Cessation of sales of new petrol and diesel cars by 2030 would provide the necessary legislative lever to make this transition over a shorter time period but it is anticipated that government intervention would be required to accommodate for the transition. Installation of charge points and associated infrastructure at a rate necessary to maintain pace with the desired rate of uptake of electric vehicles nationwide could induce significant costs to government unless significant commercial investment is also incentivised. Hydrogen schemes would need greater initial backing due to their more experimental nature. Scaling up in demand, production and fuelling infrastructure would require greater consideration for government intervention in order to overcome the initial start-up costs and catalyse a step-change in fuel choice among commercial operators[xxvii]. Overall, this recommendation is expensive as it represents a wholesale change of Scotland's road transport infrastructure to a technology which is, potentially, not affordable to large sections of the population over the short-term without financial incentives. The high indicative cost also reflects the high level of uncertainty around the optimal zero-emission technology pathway for medium and large duty vehicle types. Within the overall recommendation there are options which achieve against the objectives at a much lower overall cost. Support for zero emissions car share would enable more people to benefit from access to zero emissions vehicles whist also whist also contributing to the aim of reducing car kilometres by 20% by 2030[xxviii]. Developing a better understanding of the technological pathway to greater uptake of hydrogen powered vehicles is an essential step in establishing a model for public and private investment in delivery of a strategic hydrogen supply and distribution network. Where funding is limited, these options should be progressed with the greatest priority.

3. Public Acceptability

There is a general cultural acceptance of transitioning to a zero-emission vehicle fleet[xxix]. However, the public acceptability would differ across the different options, with further disaggregation across different sections of the public.

Public acceptability of shared mobility is potentially less than traditional car ownership[xxx]. However, electric car ownership is heavily weighted towards higher income groups, whereas community car share and leasing models may provide a more inclusive approach. Therefore public acceptability should not act as a barrier to support for zero emissions car share or a rationale for supporting private vehicle purchase.

It should also be noted that increased charge point installation should not lead to the "Proliferation of Apps" required to use charge points in the current market.

For freight vehicles, public acceptability is secondary to commercial viability, which would be highly dependent on fuel availability and total cost of operating zero emissions vehicles.

3.4. Statutory Impact Assessment Criteria

1. Strategic Environmental Assessment (SEA)

Low Scenario	High Scenario
++	++

This recommendation is likely to result in major positive results for reducing greenhouse gas emissions (SEA Objective 1) and improving air quality (Objective 3) as the net result of almost all options is to encourage a transition to non-tailpipe emission technologies. This would lead to a reduction in both greenhouse gas emissions and other pollutants, although the reduction in certain pollutants, including PM_{10} and $PM_{2.5,}$ would be less due to the presence of tyre/suspension particulates. The overall reduction of pollutants would also lead to benefits for human health. Some evidence has suggested that wide uptake of EVs can lead to more accidents due to their lack of engine noise, but the overall evidence is currently limited. There is potential for positive effects on noise and vibration (Objective 5) resulting from increased use of zero emissions vehicles. However, there is also potential for negative effects as some noise would still be created by contact between the tyre and surface, and this would be greater at higher speeds. The recommendation would also improve the sustainability of the transport network (Objective 8) as it would encourage the installation and use of a charging network. The wider effects on usage of natural resources (Objective 9), for example the mining of rare earth metals for EV batteries, are currently unclear. No significant effects are expected for water, biodiversity, soil, cultural heritage or landscape and visual amenity (Objectives 10 to 14), although there is the possibility of localised effects on the environment for some options. For this reason, any new infrastructure would need to complement and integrate with the existing townscape setting, including any cultural heritage assets. Further environmental assessment or consultation with Historic Environment Scotland and NatureScot may therefore be required. There is no (or negligible) clear link to the achievement of the remaining SEA objectives (Objective 2, 4, 6 and 7).

Overall, across all SEA objectives, this recommendation is expected to have a moderate positive effect against this criterion in both the Low and High travel behaviour variant

scenarios.

2. Equalities Impact Assessment (EqIA)

Low Scenario	High Scenario
0	0

Zero emission vehicles are currently more expensive to purchase (although cheaper to operate over their lifetime) than traditional ICE options and if the uptake of zero emission vehicles leads to potential future barriers to ICE then this could adversely impact on groups who have affordability barriers to car ownership such as women, younger people, older people, disabled people and some ethnic minority groups. This is especially the case where certain groups may be forced into car ownership and use due to limited public transport alternatives for accessing services such as employment, education, healthcare and shopping[xxxi].

However, there does exist the possibility that this recommendation could have positive impacts on some groups, for example, the provision of charging infrastructure would benefit those who already owning an EV and rely on a private vehicle to access key services. The lower fuel and running costs of EVs could also benefit low-income households who depend on car travel for journeys.

Overall, this recommendation is expected to have a neutral impact against this criterion in both the Low and High travel behaviour variant scenarios.

3. Island Communities Impact Assessment (ICIA)

Low Scenario	High Scenario
+	+

The impact on Island Communities is expected to be positive, particularly with the installation of charge points at ferry terminals, providing opportunities for better multi-modal integration. The increased provision of zero emission vehicle charging / refuelling points on islands may also support tourism, through enabling mainland users to charge/ refuel easily and safely. The development of renewable energy systems could also lead to the development/installation of infrastructure that can target the natural renewable assets of the Island Communities, particularly in the generation of hydrogen. In addition, the directly targeted funding for Island Communities would be positive.

However, due to the dispersed nature of settlements and population, islands are often faced with a greater number of difficulties in relation to EV charging infrastructure such as grid connection costs and maintenance issues. Therefore, the availability of charging points could be a barrier to the use of electric vehicles in island communities.

Overall, this recommendation is expected to have a minor positive impact against this criterion in both the Low and High travel behaviour variant scenarios.

4. Children's Rights and Wellbeing Impact Assessment (CRWIA)

Low Scenario	High Scenario
+	+

This recommendation is anticipated to have a positive impact on children's health from overall improved air quality covered in the Strategic Environmental Assessment.

Overall, the impact of this recommendation against this criterion has been assessed as minor positive in both the Low and High travel behaviour variant scenarios.

5. Fairer Scotland Duty Assessment (FSDA)

Low Scenario	High Scenario
-	-

As discussed in the EqIA, the increased provision of infrastructure for zero emission vehicles, and the various incentives and schemes to improve the overall uptake, are likely to have a more positive impact on those who currently have an EV or are able to afford to purchase a private vehicle.

Although the lower fuel and running costs of EVs would benefit low income households who depend on car travel for journeys, the initial purchase costs of an EV would still be out of reach for many low-income households and potentially exacerbate inequalities for those from socio-economically disadvantaged groups. Support for car share and lease models would provide a more inclusive path to vehicle decarbonisation.

Untargeted investment in private vehicle infrastructure would favour those members of society who have the financial means to choose this transport mode and so would have the long-term effect of embedding private car use as a means of accessing employment, goods and services. However, government support for zero emission community car share schemes is more likely to produce a positive benefit in terms of providing access to zero emissions vehicles for all income groups and reducing the absolute number of vehicles on the road. This has the potential to improve health inequalities in disadvantaged and deprived communities through improved air quality and increased opportunities for active travel and public transport.

Overall, this recommendation is expected to have a minor negative impact against this criterion in both the Low and High travel behaviour variant scenarios, though this could alter if zero emission car share is pursued with greatest priority.

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