



Orkney's Electric Vehicle Infrastructure Strategy

Orkney Islands Council.

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Summary

The Scottish Government have set ambitious climate change targets to create a low carbon Scotland. The Climate Change (Scotland) Act 2009 is the most ambitious piece of climate change legislation in the world and sets the target of at least 42% emissions reductions in Scotland by 2020.

As part of the legislation, the Scottish Government is aiming for an almost complete decarbonisation of road transport by 2050, with significant progress by 2030 through the adoption of electric vehicles as well as a modal shift towards public transport and active travel.

Some progress has already been made with meeting this ambitious target and in 2012 it was reported that almost 39% of Scotland's electricity needs were generated by renewable sources. Emissions from new vehicles have also fallen by a quarter in the last decade and will fall by a third more in the next.

Orkney has a distinctive environment which is full of arts, culture and history. It is important to protect the environment we have and consider the impact that our work may have on our much valued natural and historic assets.

Transport is one of the most important issues in Orkney and its fragile scattered archipelago of islands. Public bus usage in Orkney has increased by 42% since 2010 and figures continue to rise. Orkney also has walking and cycling levels which are higher than the national average.

Orkney Islands Council recognises the development for a low carbon, multi-modal and integrated transport system, 'now, tomorrow and for future generations' and the vision remains to achieve a 'sustainable future for transport'.

Orkney has one of the highest car ownership levels in Scotland given our largely dispersed population. The majority of car trips made in Orkney are relatively short and are therefore ideal journeys to be made by an electric vehicle. Electric vehicles could also be one way for the county to capitalise on over-production from wind and marine turbines and strengthen our case for improved grid connectivity.

There are already a number of electric vehicles and electric charge-points in the county and this strategy aims to address the way forward to promote and encourage decarbonisation of road transport in Orkney.

Orkney is leading the way in the renewables industry and is home to the world-leading test site to convert wave and tidal energy into electricity. It therefore seems apt that we should also lead the way in promoting and encouraging decarbonisation of road transport.

The Orkney Islands are already acknowledged for being 'Green'. Now let's aim to make Orkney greener.

Introduction

The Electric Vehicle Infrastructure Strategy for Orkney reflects the vision for Scotland outlined in Transport Scotland's 'Switched on Scotland: A Roadmap to Widespread Adoption, of Plug-in Vehicles', September 2013.

The Roadmap sets out a vision that 'by 2050 Scottish towns, cities and communities will be free from the damaging effects of petrol and diesel fuelled vehicles'. The strategy document outlines a series of goals and measures including the need for policy frameworks to have plug-in vehicles embedded in all relevant areas of policy.

The Electric Vehicle Infrastructure Strategy for Orkney also reflects the local goals and objectives outlined in the Local Transport Strategy and Low Carbon Strategy for Orkney.

The purpose of this strategy

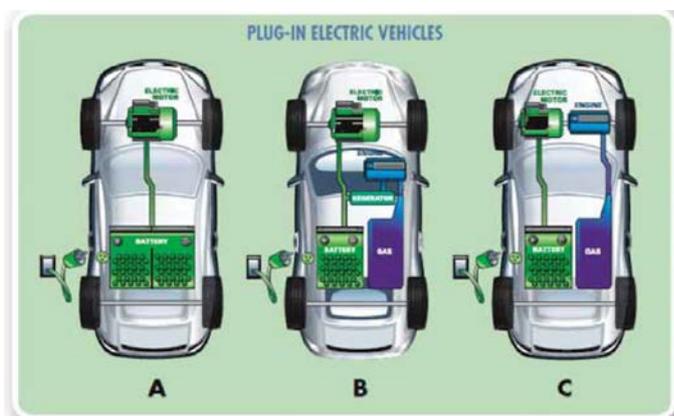
It is important to provide electric charging points in Orkney so that we have suitable infrastructure in the county to support the use of electric vehicles. This strategy shall aim to set out the overarching plan for charging infrastructure and provides targets for its roll-out across the county subject to external funding.

The strategy will therefore aim to outline the types of locations where the charging infrastructure will be installed, with the aim to have these accessible for public use. The strategy will also outline the reasons why electric vehicles should be promoted and encouraged in an attempt to make Orkney greener and meet with national climate change targets.

The Electric Vehicle Infrastructure Strategy for Orkney is supported by HITRANS and Orkney Renewable Energy Forum (OREF) and will involve collaborative support from Roads Services, Economic Development and the Transportation Service within Orkney Islands Council to ensure that the strategy's aims and objectives will be achieved.

What is an electric vehicle?

Figure 1.1: Plug-in vehicle configurations.



- A) Battery EV.
- B) Series plug-in hybrid.
- C) Parallel plug-in hybrid.

(Source: Switched on Scotland)

An electric vehicle is powered either in full, or in part, by an electric motor as outlined in Figure 1.1. Electric cars that are charged by connecting to the electricity supply network are known as battery electric vehicles or BEVs as outlined in Car A. Alternative models use batteries that work in tandem with an internal combustion engine; these are known as plug-in hybrids or PHEVs as outlined by Car B and Car C.

At present, the range of a BEV model is around 100 miles (Based on Nissan Leaf model) under average driving conditions and the overall range of a PHEV model is comparable to petrol and diesel powered vehicles. In this strategy, the term 'electric vehicle' refers both to BEVs and PHEVs.



Whilst this strategy will focus on the charging infrastructure for electric cars, it is also important to recognise the importance of encouraging the electrification of larger vehicles such as commercial and public service vehicles. It is likely that specific-use vehicles such as public service buses will require dedicated charging facilities.

Why promote electric vehicles?

Electric vehicles offer a number of environmental benefits compared with petrol or diesel operated vehicles. We understand that there are many Orkney households which rely on their car for access to work, leisure or education purposes and walking, cycling or using the bus may not be an option, particularly in rural areas.

Orkney's Carbon Management Programme outlines that transport in Orkney accounts for the highest levels of carbon dioxide emissions in tonnes per year compared with building electricity, heating or waste. The aim is to therefore reduce this figure year on year which is consistent with Target 4 of the Council Plan a 'Low Carbon Orkney' – a green approach. One of the Council objectives is to have a revised Low Carbon Strategy in place during 2014/2015 that will work towards setting Orkney specific goals and objectives on reducing carbon emissions.

Orkney has high car ownership levels which are responsible for a high proportion of the CO₂ emissions produced in the county. By working towards the principal of using electricity which has been created by our renewables in Orkney then we are working towards carbon-free motoring.

Electric vehicles have zero emissions at the point of use and can therefore improve our air quality and indeed traffic noise thereby creating an improved island on which to live, work and enjoy. There are also economic benefits to using an electric vehicle. Petrol and diesel prices in Orkney are much higher than the national average, which, therefore, makes our daily commutes much more expensive than other areas. By changing to an electric vehicle, local motorists no longer need to deal with volatile fuel costs and instead charge using a low rate domestic energy rates, typically around 3p/kWh (Assumes domestic energy cost of 14p/kWh, vehicle energy demand of 0.2 kWh, and energy efficiency of 85 per cent - Source: London's Electric Vehicle Infrastructure Strategy) . Electric vehicles are also exempt from road tax and often incur lower insurance premiums.

Barriers to Electric Vehicle Adoption

Transport Scotland's policy document 'Switched on Scotland' outlines the key barriers to plug-in vehicle adoption following a series of workshops. These are barriers that need to be overcome as outlined at Figure 1.2.

Figure 1.2: Priority Barriers (Source: Switched on Scotland).

Barrier	Description
High purchase cost.	EVs and PHEVs retail at higher prices than comparable ICE (Internal Combustion Engine) models.
Limited range of EVs and range anxiety.	Drivers place a high utility on the ability to drive long distances, even if such trips are rare.
Availability of recharging infrastructure.	Perceptions of the public recharging infrastructure network, the time required to recharge and issues associated with 'range anxiety'.
Availability to value whole-life running costs of vehicles.	Consumers mainly concentrate on the purchase price as opposed to the whole-life benefits such as lower maintenance and fuel costs.
Residual value.	Uncertainty about the extent to which EVs will retain their value for resale and the effects of depreciation of batteries.
Lack of public awareness and knowledge.	The current level of public awareness and knowledge of EVs is low, with the average consumer having little understanding about their operation, driving experience and potential benefits. Furthermore, improvements in EV performance and efficiency are only of use if consumers are aware of them.
Aversion to new technology.	Consumers can be cautious and prefer familiar and trusted technologies.
Performance and choice of vehicles.	EVs will possibly not be suitable for all applications and there is a limited choice in the early market for consumers. Lifespan of batteries. Questions about the longevity of batteries, how this will affect performance and residual value.
Capacity of local distribution networks.	Large numbers of drivers recharging at similar times will place significant pressure on the local electricity distribution network.
Backing the wrong technology.	Perceptions that EVs may ultimately be superseded by other technologies such as hydrogen fuel cell vehicles.
Green credentials.	The carbon intensity of electric generation, concerns about the whole-life impact of EVs and the sustainability of materials required for battery production.

Lack of allocated parking for domestic recharging.	The ability to recharge an EV at home is dependent on the availability of allocated and ideally off-street parking.
Lack of aftersales support networks.	Uncertainty about the availability of support and necessary skills at dealerships, garages and breakdown services.
Business models.	The long-term commercial viability of business models associated with the provision of EVs and recharging infrastructure.
Risk of lack standardisation and interoperability.	The lack of common standards for plugs, sockets, access keys and ICT systems could impact the confidence of consumers and manufacturers.
End of life batteries.	The capital and environmental cost of disposing of batteries once they have reached the end of their natural life.

Goals and Vision for Scotland

The policy document ‘Switched on Scotland: A Roadmap to Widespread Adoption of Plug-in Vehicles’ has established that progress is needed in seven key areas in order to reduce the barriers to electric vehicle adoption, for which goals have been set. These goals set out the way forward for the vision that by 2050 Scottish towns, cities and communities will be free from the damaging effects of petrol and diesel fuelled vehicles. This vision builds upon the existing commitment to almost complete decarbonisation of road transport by 2050.

Figure 1.3: ‘Switched on Scotland’ key areas (Source: Switched on Scotland).

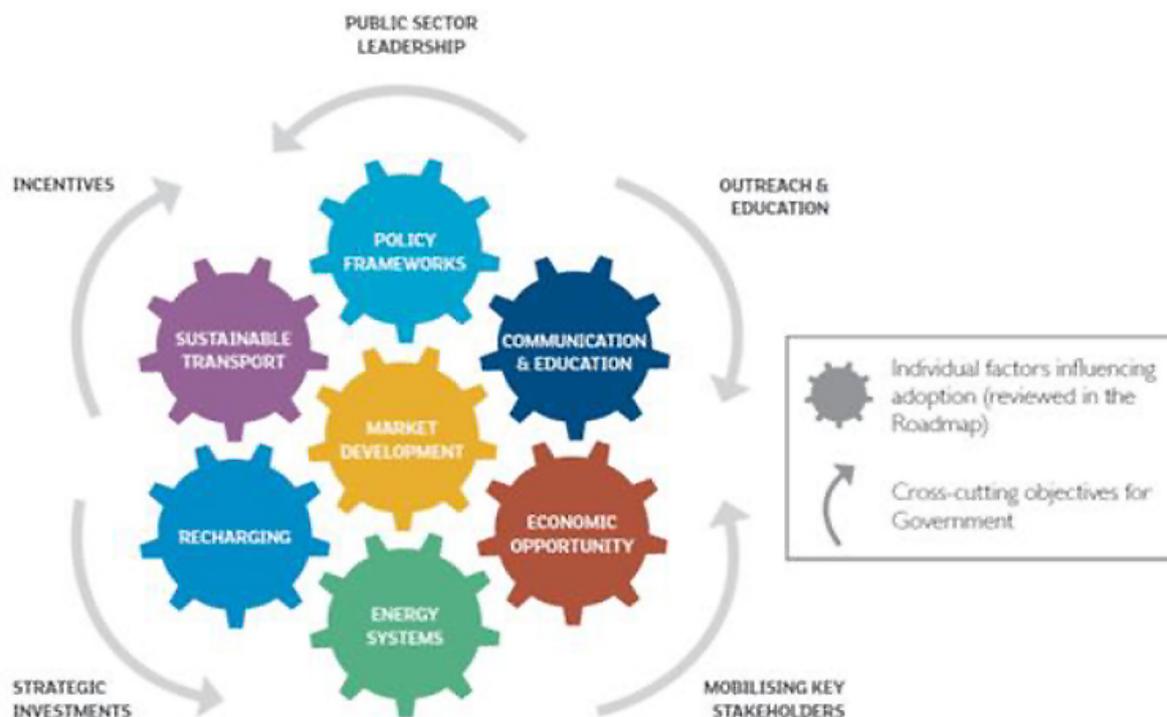
Key objectives		
1.	Policy frameworks.	Plug-in vehicles are embedded into all relevant areas of policy and advance goals on climate change, air quality, renewables, energy, security and public health.
2.	Market development.	Plug-in vehicles become more desirable than fossil-fuelled alternatives.
3.	Recharging.	Targeted, convenient and safe recharging infrastructure is deployed across Scotland to meet the changing needs of the market.
4.	Sustainable transport.	Plug-in vehicles promote more sustainable transport systems rather than adding to existing problems.
5.	Energy systems.	Scotland’s electricity grid supports increased adoption of plug-in vehicles and is made smarter by managing recharging and distribution energy storage.
6.	Economic opportunity.	Early leadership in advancing plug-in vehicles creates jobs and makes business more competitive.

7.	Communication and education.	Increased awareness and confidence in plug-in vehicles encourages widespread adoption.
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Figure 1.4: Key commitments under each priority objective (Source: Switched on Scotland).

Key Commitments	
Providing public sector leadership.	<ul style="list-style-type: none"> • Off-road charge point legislation. • Installation of charge points at main Government buildings. • Replacement of Government vehicles with plug-in where appropriate.
Making strategic investments.	<ul style="list-style-type: none"> • Investment to support uptake of low carbon vehicles. • Deployment of rapid charge points at intervals of at least 50 miles on Scotland’s primary road network. • Support promotion of shared plug-in vehicles.
Providing incentives.	<ul style="list-style-type: none"> • Development of a national framework. • 100% funding for installation of home charge points. • Funding to incentivise businesses to install workplace charging.
Mobilising key stakeholders.	<ul style="list-style-type: none"> • Multi-stakeholder groups to review challenges and opportunities of recharging. • Continued work with energy suppliers to encourage deployment of tariffs and technologies.
Outreach and education.	<ul style="list-style-type: none"> • Development of an outreach and education strategy for plug-in vehicles. • Development of marketing campaigns to raise awareness. • Working with key stakeholders to educate and create a skilled workforce for plug-in vehicles.

Figure 1.5: Government cross-cutting objectives.



The objectives outlined in Figure 1.5 set out the cross-cutting objectives that will be used by the Government to drive sustained progress in each of the seven inter-linked areas reviewed in the Roadmap.

The E-cosse Partnership

E-cosse is a partnership of government, industry and other key stakeholders formed to encourage the wholesale adoption of electric and plug-in hybrid vehicles in Scotland.

The partnership aims to establish Scotland as an 'Electric Vehicle Pioneer, maximising the economic, environmental and social benefits of EVs as an integral part of sustainable transport system and a smart energy grid.'

The partnership is concerned with:

- Promoting behaviour change.
- Promoting the wider benefits of EVs.
- Encouraging fleet operators to buy EVs.
- Encouraging private users to buy EVs.
- Overcoming range anxiety.

For further information on electric vehicles visit: www.e-cosse.net.



Orkney Delivery Plan

Orkney Islands Council recognises the need to develop a low-carbon, multi-modal and integrated transport system, 'now, tomorrow and for future generations' and the vision remains to achieve a 'sustainable future for transport'.

In addition to Local Authority fleet, there are already a number of local organisations and residents that have invested in electric vehicles but our aim is for this to grow significantly over the next decade. For this strategy to be successful, it will require support from local community groups and organisations as well as support from Transport Scotland to provide grant funding opportunities to the local authority, organisations and individuals.

The four key principles of the strategy are therefore:



Figure 2.1: Policy Framework.

Policy Frameworks.	To promote the inclusion of electric vehicles in relevant Council policies and strategies.
Infrastructure.	To develop a comprehensive network of electric charging points in the county as and when funding opportunities arise.
Vehicles.	To consider the purchase of an electric vehicle when replacing existing Council fleet and encouraging widespread adoption of electric vehicles in the county by providing accessible infrastructure.
Communication and Education.	To encourage the widespread adoption of electric vehicles in Orkney by making the community aware of the opportunities and advantages.



Policy Frameworks

Transport Scotland's goal is for plug-in vehicles to be embedded in all relevant policies and strategies and this is supported by Orkney Islands Council. This goal forms one of the four key elements of the strategy and means cross working between services and external agencies to ensure new or revised policies and strategies consider and promote electric vehicles in Orkney. This is considered to be the first step towards making Orkney greener.

In the first instance this strategy will be linked to:

- The Council Plan.
- Low Carbon Strategy for Orkney.
- Carbon Management Strategy.
- Local Transport Strategy for Orkney.
- Orkney's Local Development Plan.
- A Sustainable Energy Strategy for Orkney.

82% of people in Orkney have access to one or more vehicles (Source: Scottish Census data 2011).

Infrastructure

It is acknowledged that electric vehicles have a shorter range than comparable petrol/diesel vehicles at present however it is also known that the majority of travel in Orkney is short journeys hence an ideal county to promote and encourage their use. The lack of charging infrastructure can be seen as a major barrier to greater use of electric vehicles. Orkney Islands Council has already installed a number of charging points in the county following infrastructure funding from Transport Scotland's 'Plugged in Places' Initiative.

Information about the various electric charge points that can be used by the public across the UK is outlined on the 'Charge Your Car' website at <http://chargeyourcar.org.uk/> . Existing electric charge points in Orkney are located at:

Area	Location
Kirkwall.	East Kirk Car Park. St Rognvald's House. Great Western Road Car Park.
St Margaret's Hope.	Braeburn Court Care Home.
Dounby.	Dounby Primary School Car Park.
Stromness.	Old Academy Business Car Park.

It is expected that future funding will be available for the installation of fast and rapid charge points which will be explored further by the Council. It is envisaged that a number of charge points will be installed specifically for the use of commercial vehicles and the remaining units will be placed in accessible locations for public use.

Scottish Planning Policy (SPP) states that 'the planning system should support the installation of new technologies, such as charging points for electric vehicles

(Scottish Planning Policy, February 2010, page 34). The Council as the Planning Authority will therefore support the inclusion of charge points and other associated infrastructure for larger developments such as hospitals, schools, leisure facilities and new housing developments where practicable.

Whilst there is a need for charging infrastructure which is accessible to the public in Orkney, overnight recharging at home should be seen as the most convenient and cost effective method to charge an electric vehicle. The Energy Saving Trust provide information on fully funded 32amp charge points and associated installation costs for the home to encourage the uptake of electric vehicles. More information can be found at <http://www.energysavingtrust.org.uk> .

Whilst there is currently no financial charging mechanism to use the electric charge point infrastructure in Orkney, this will be considered further as the uptake of electric vehicles continues to rise. This is outlined further in the Accessible Charging Infrastructure section of this strategy document.

Future provision of public charge points may, therefore, depend on the potential to realise sufficient revenue from this infrastructure. Where charge points are located in one of the local authority car parks for example, then restriction of use must be considered. Restrictions include a clear stipulation (and, later, enforcement) that parking spaces for charge points are limited to electric vehicles that are actively recharging. It may also be necessary to limit the duration of parking and recharging in some locations. This regulation will ensure that charge points experience a suitable rate of turnover and are available to potential users throughout the day.

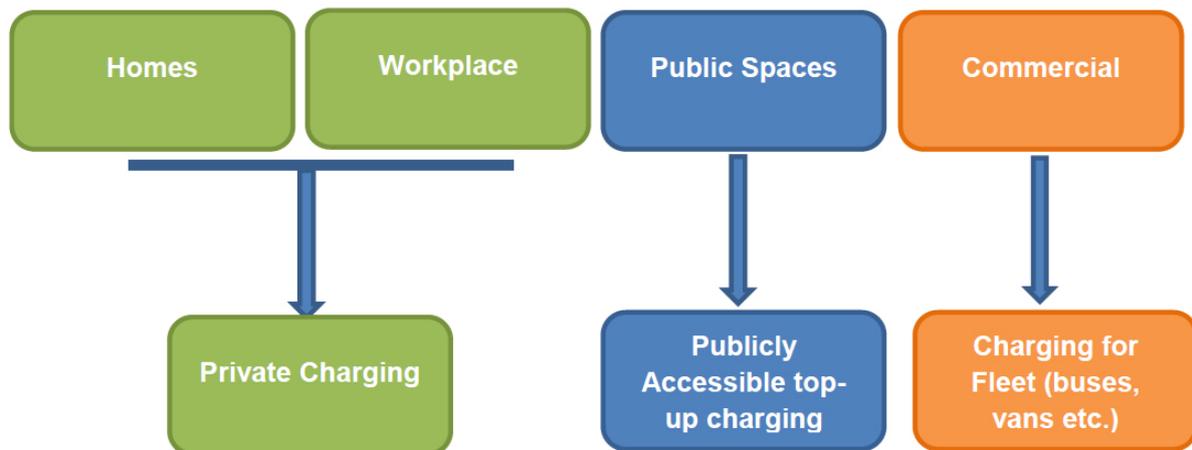
Should the introduction of financial charging be introduced for charging/parking in Orkney then this should be as straightforward as possible. Current charge points are compatible with the Charge Your Car cards and it is important that any new infrastructure supports this method. The principle of charging for the use of electric charge points in Orkney will be considered further before implementation.

It is, therefore, envisaged that the majority of recharging will be completed at homes and to a lesser extent workplace areas. This is considered to be the greenest and most convenient means of charging electric vehicles.

The charge points that are available in public spaces will be used to “top-up” charge rather than be the main source of charging. The method of “top-up” charging is vital to extending battery range and the relevant infrastructure should encourage uptake of electric vehicles.

The commercial element will be charge points which are specifically for commercial business use either by the local authority or private businesses, as outlined at Figure 2.2 below.

Figure 2.2: Likely split of charging points in Orkney.



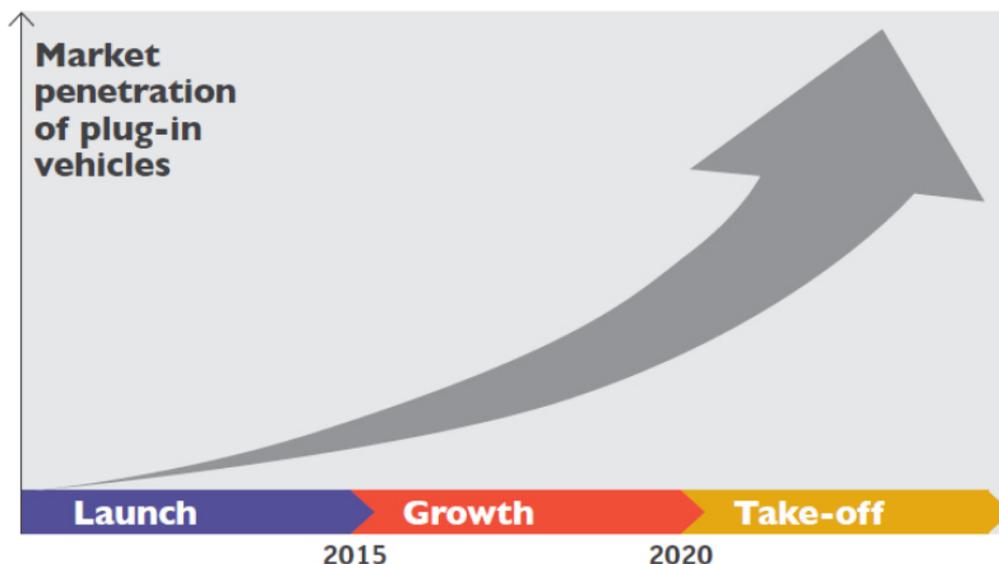
Vehicles

In July 2012, Orkney Islands Council replaced one of its light goods commercial vehicles with an electric powered pick-up. The vehicle is used for special refuse collection, promoting both recycling and reduced emissions, and therefore, a greener Orkney.

When considering replacement fleet, Orkney Islands Council ensure that Euro V standards are met as a minimum and electric vehicles are considered where appropriate. As at April 2014, Orkney Islands Council has purchased 4 electric vans, 1 electric pick-up and 1 electric car which have replaced petrol or diesel powered vehicles.

The number of electric vehicles in Orkney has increased significantly over the past year and it is expected that this will continue to rise year on year which is consistent with Transport Scotland's vision as outlined in Figure 2.3 below. It is therefore necessary to have recharging infrastructure in place by 2015 to meet the needs of the market.

Figure 2.3: Three phases of market penetration of electric vehicles (Source: Switched on Scotland).



The Orkney Renewable Energy Forum (OREF) has been promoting electric vehicles for a number of years in Orkney. As at 1 April 2014, there were 19 electric cars and 5 commercial vehicles operating in our island community of around 21,000 people.

Orkney is a superb location for electric vehicles with lower than average commuting distances and a surplus of renewably produced electricity. The renewables in Orkney often produce more than twice our electricity demand. We are however currently constrained by our grid from producing more renewable energy and a solution to this, for example, could be for the energy to be used to power electric vehicles—making this archipelago a completely zero carbon model.

The opportunity is here in Orkney to benefit from our wave and wind power to make for a sustainable green community.

“My Electric Avenue”



‘My Electric Avenue’ is a UK wide project which was officially launched in June 2013, marking the start of one of the most innovative initiatives of its kind. The project was established to test the ability of local electricity networks to cope with the recharging of electric vehicles.

The concept was well received with over 100 expressions of interest from people in Orkney who were keen to find out more about taking part in the trials. Whilst this scheme is now full, social trials are still available to enable UK residents to be part of Britain’s largest electric vehicle trial to test and shape the electricity network for the future.

Benefits:

- Save up to 85% on your monthly fuel bill.
- £2-3 will take you 80-100 miles (the cost of one recharge overnight).
- Zero road tax.
- Zero tailpipe emissions.
- Zero petrol or diesel cost.
- Fantastic driving experience – smooth, quiet, no clutch or gears.

For further information on current trials and the benefits to you visit:

<http://www.myelectricavenue.info/>



Communication and Education

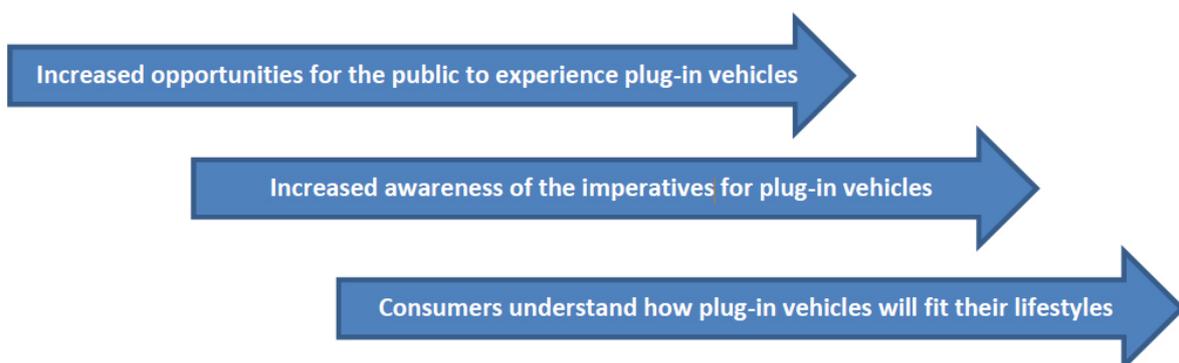
One of Transport Scotland's goals is to increase awareness and confidence in plug-in vehicles and encourage widespread adoption.

Orkney Islands Council is committed to highlighting the benefits and opportunities available for the purchase and/or leasing of electric vehicles. This principle has been adopted by the Council when considering replacement fleet and this message should be made clear to the community for the widespread uptake of electric vehicles.

Where possible, the Council should provide community groups, organisations and members of the public with the opportunity to have first-hand experience of electric vehicles in order to eliminate any misconceptions or concerns.

The Council should also make the wider community aware of any grants and/or funding opportunities which may be available.

Figure 2.4: Communication and Education (Source: based on information from Switched on Scotland).



During the 'market launch' phase, it is important to increase awareness and provide confidence to encourage widespread adoption of electric vehicles. This can often be achieved through peer networks through which positive experiences can be promoted. It is also important to educate our 'future generation' so that they are engaged and committed. The importance of active travel is already promoted to

children and young people and the benefits of electric vehicles could be relayed in a similar way.

Driver training of electric vehicles often relieves misconceptions and gives confidence in the technology. The Council has supported promotional days whereby interested residents can have the opportunity to experience an electric vehicle. The interest in Orkney has been high and has resulted in a number of participants joining the My Electric Avenue Social Trials. The Council will continue to support promotional days that look to raise awareness and the market growth of electric vehicles in Orkney.

It is important to have the ability to have an electric vehicle checked and maintained locally in Orkney which requires the support of local garages. This is consistent with the Switched on Scotland target of 'a skilled workforce which supports widespread operation of plug-in vehicles'. Should external funding be available, local mechanics would have the opportunity to receive specialist training on maintaining electric vehicles which will create a skilled electric vehicle workforce in Orkney. This opportunity will be explored further by the Council.

Accessible Charging Infrastructure

The lack of public recharging infrastructure is perceived to be a barrier to the growth of electric vehicles. Further to the charging infrastructure already in place in Orkney, it is important to provide a charging network across Orkney to provide “top-up” charging for electric vehicles as and when required.

Figure 3.1: Opportunities and Challenges.

Public Infrastructure.	
Opportunities: <ul style="list-style-type: none"> • A low carbon Orkney. • Improved air quality. • Elimination of high fuel costs. • Use energy created by renewables. • Availability of funding (short term). 	Challenges: <ul style="list-style-type: none"> • Co-ordination, marketing and installation of charge points across the county. • Availability of long term funding. • Rapid advances in technology. • Replacement and maintenance of charge points.
Enablers: <ul style="list-style-type: none"> • External funding. • Guidance on standards and policy. • Local political support. • HITRANS procurement of future infrastructure/maintenance? 	Barriers: <ul style="list-style-type: none"> • Rapid advances in technology. • Reliability. • Lack of standard access. • Cost to monitor or apply fines.

Figure 3.2: Charge Point Types.

Charge Point Types Available in the UK.	Time to Charge.
‘Slow’ points 3kW (13A) supply.	6-8 hour charge time.
‘Fast’ points single or three phase 7-22 kW (16-22A supply).	3-4 hour charge time.
‘Rapid’ points provide 40kW + AC or 50 kW = DC supply.	80% charge in 30 minutes.

Slow or Fast charge points may be suitable for workplace (or similar) locations where the electric vehicle can be left for a prolonged period of time. Non-rapid charge points may also be suitable for commercial use, in which vehicles are only used at specific times.

For an accessible network across Orkney to be effective, charging must be quick and effective. Rapid charge points provide an 80% charge in just 30 minutes,

significantly quicker when compared with fast charge points, which take 3-4 hours to fully charge a battery. Unfortunately, rapid charge points are more expensive than fast or slow charge points. Rapid charge points at key locations of Stromness and Kirkwall are recommended in the first instance, with the view to extend this to other key hub areas subject to external funding and suitable infrastructure.

Key 'hub' areas in Orkney have been considered where it is envisaged that the charge points will be well used. Whilst it is expected that charge points would have higher use in Kirkwall and Stromness, there is also a need for charge points in other key habited areas of Orkney in order to provide a comprehensive charging infrastructure network in Orkney. To accomplish this it is also important to consider 'hub' areas between Kirkwall and Stromness, harbour areas, Kirkwall Airport, key tourist sites, recreational and/or shopping areas, for example.

Orkney 'Hubs'

Phase 1 - The key areas for charge points during the first phase of development were Kirkwall, Stromness, Dounby and St Margaret's Hope as outlined in Figure 3.4. These are highlighted in green as they represent the first phase of the network however. However, it is envisaged that, as Stromness and Kirkwall are key hub areas, the installation of additional fast and rapid charge point infrastructure in these areas will be considered.

Phase 2 - Other key residential areas for consideration of fast and rapid charging infrastructure include Birsay, Tingwall, Houton, Finstown, Kirkwall Airport and Toab, Tankerness or Deerness. This would represent Phase 2 of the accessible charging infrastructure for Orkney. Infrastructure for these areas will be considered further during 2014/15 and 2015/16 financial year and will be subject to external funding.

Phase 3 - Following the infrastructure improvements made during phase 2, electric charging infrastructure would be recommended in a number of the inner and outer isles, either at the ferry terminal areas or community halls/schools. It is recommended that the Local Authority engages with Community Trusts and Organisations in finding external funding for fast/rapid charge points to encourage the adoption of electric vehicles in the islands of Orkney.

As the adoption of electric vehicles increase, consideration of charge areas would extend to hub areas such as Deerness, Tankerness, Holm, Burray, South Ronaldsay, Evie, Rendall, Twatt, Quoyloo and Orphir subject to use of existing infrastructure and availability of external funding.

Figure 3.3: Principles guiding distribution of charging points.

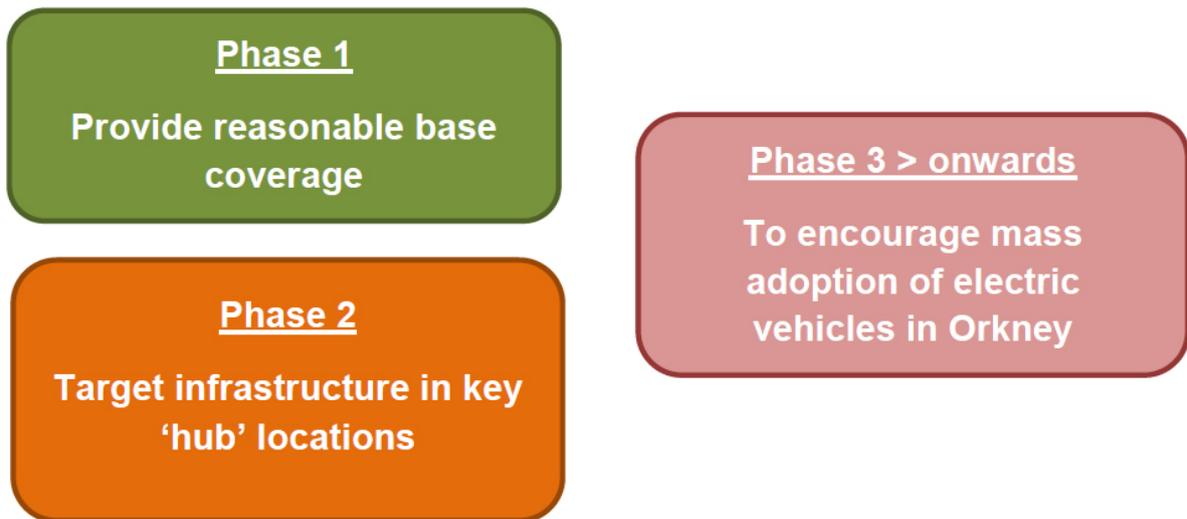


Figure 3.4: Anticipated charge point locations in Orkney – Phase 1 – 3.

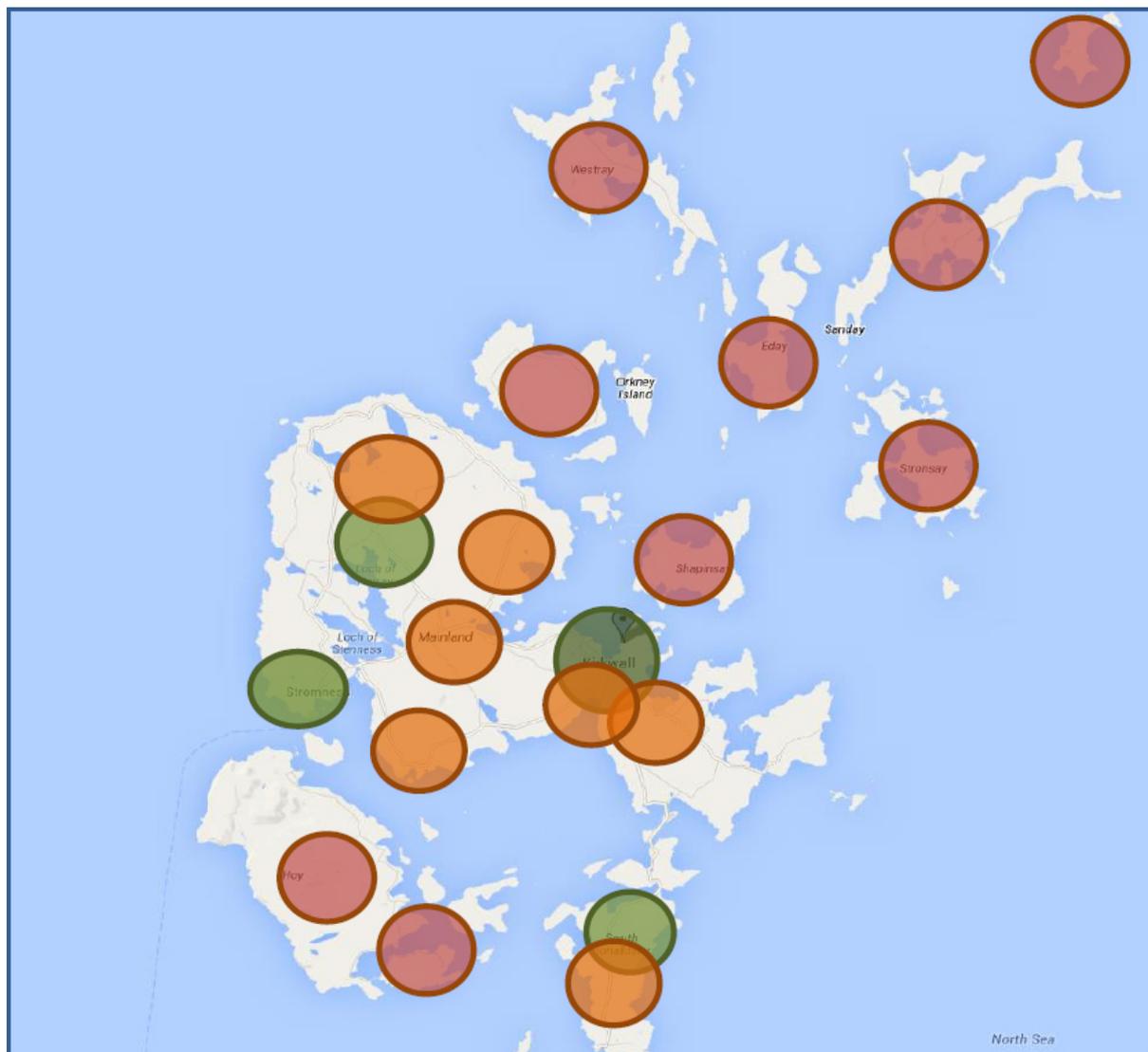


Figure 3.5: Anticipated publicly accessible charge point locations.

(Subject to funding and power connectivity).

Phase	'Hub' Area	Suggested Site(s)	Responsibility	Reason for charge point location
2.	Kirkwall.	Suitable central car park location.	OIC.	EV charge points required in the centre of town. Consideration of additional fast charge points at OIC, Picky Centre, NHS and/or large housing areas
2.	Stromness.	Suitable central car park location.	OIC.	EV charge points required in the centre of town.
2.	Kirkwall Airport.	Kirkwall Airport car park.	OIC.	EV charge point required for bus/cars.
2/3.	Finstown.	Finstown car park.	OIC.	EV charge point required between two key hub areas of Kirkwall and Stromness.
2/3.	Tingwall.	Tingwall car park.	OIC.	EV charge point required for use when travelling to/from Rousay/Egilsay/Wyre.
2/3.	Houton.	Houton car park.	OIC.	EV charge point required for use when travelling to/from Hoy/Flotta.
3.	Toab / Tankerness.	St Andrews School car park or Tankerness Hall.	OIC.	EV charge point required in East Mainland area to create network across Orkney
3.	Birsay.	Vicinity of Birsay Palace car park.	OIC.	EV charge point required in popular tourist/new housing area.
3.	Inner and outer isles.	Primary School / community centre and / or pier areas where appropriate.	OIC and/or community trusts etc.	EV charge point for use by community and visitors to the island.

>	Various.	Encourage local businesses to install electric charge points for convenience of customers / staff.	Local businesses.	Convenience for customers / potential income generation by charging for use.
>	Key Parish areas.	Schools/ community halls/car parking areas.	OIC / Community groups.	To enhance the charging network in Orkney.



Self-funding Charging Infrastructure

Short term funding is currently available through the 'Plugged-in Places' Initiative for local authority areas in Scotland to provide charging infrastructure in key hub areas. It is important for the local authority to consider how infrastructure will be maintained, and in the future replaced, as the availability of long term funding is unknown.

It is, therefore, anticipated that once the adoption of electric vehicles increases, the cost of the electricity used to charge a vehicle will be passed back to the user. Currently the charging infrastructure in Orkney is set up to accept the 'Charge your Car' cards.

Overall, the cost to the user is minimal when compared with diesel/petrol operated vehicles. The average cost to charge an electric vehicle is approximately 2p per mile, which equates to around £1.80 for a full charge (Based on a Nissan Leaf model and home charging rates). Home charging is expected to be the cheapest and most efficient method of charging an electric vehicle as a slightly higher rate may apply for "top up" charging as this would usually be carried out at peak energy times.

Currently, free electric vehicle charging is available in Scotland up until January 2015. However, the ultimate goal is that the charging infrastructure in Orkney becomes self-funding, which is consistent with the car parking charges currently applied in the county. The Council plans to consider a pricing mechanism during Phase 2/3 of the distribution of charge points across the archipelago.

Two main priority action areas have been considered as part of the self-funding concept of Orkney’s charging infrastructure:

Priority Action 1 is to consider a pricing mechanism for the use of electric charge points so as to ensure the continuation of the infrastructure as future grant funding is unknown. Furthermore, because funding is unknown, it is likely that the responsibility for maintaining and replacing charging infrastructure will sit with the relevant local authority area. The Council will, therefore, liaise further with HITRANS on the feasibility of a maintenance agreement for all charge points across the Highlands and Islands for the long term.

It is proposed that alternative charging rates are considered depending on what time the charge point is being used. For example a higher rate may apply during peak times (i.e. 08:00 – 18:00) and a cheaper rate may apply in the evenings. Another option would be to consider alternative rates for a slow, fast and rapid charger given the length of charge time varies considerably. In this example you would expect to pay a premium for rapid charging.

Priority Action 2 is to consider restrictions on the use of electric charging bays in the car parks which are the responsibility of the Council. This will require additional staff resources so that this can be monitored effectively. It is envisaged that restrictions for use will only apply to charge points in central locations that are subject to frequent use. It is important to have a turnaround of electric charging bays, and therefore, a consideration of fines to those who park in the spaces and do not use them for the purpose of charging. In some key car parking areas there may also be restrictions applied that restrict the length of use of the bay.

The priority actions will be considered in tandem with the introduction of additional charging infrastructure in Orkney as outlined in Figure 3.6.

Figure 3.6: Charging Infrastructure Actions.

Action	Factors for consideration	Implementation
1. Consider a pricing mechanism for the use of electric charge points.	<ul style="list-style-type: none"> • Rate linked with time of use (i.e. peak = 08:00 - 18:00). • Rate for ‘Rapid’ charging. • Rate for ‘Fast’ charging. • Rate for ‘Slow’ charging. • Mechanism – ‘Charge Your Car’ Card. 	Phase 2 / 3 (after January 2015).
2. Consider restrictions on the use of electric charging bays in Council car parks	<ul style="list-style-type: none"> • Need to create turnaround of charging bays. • Fine for use of bay for non-electric vehicle. • Fine for use if not charging. • Restricted time to use bay i.e. in line with current first hour free principal. • Monitoring/fines – to be applied by car parking attendants. 	Phase 2 / 3

Charge your Car – How it works

The electric charging infrastructure in Orkney is currently compatible with the 'Charge Your Car' card. Further information can be found on <http://chargeyourcar.org.uk/> and an easy step-by-step guide is illustrated at Figure 3.7 below.

Figure 3.7 Charge Your Car Step-By-Step Guide.

Step
1



Download the free app.

Use the app while on the go to locate a charge point, plan a route, check availability and tariffs, start, stop and pay for charging on all app-enabled charge points. Download free from the [App Store](#) or [Google play](#). Alternatively, the charge points in Orkney are mapped on the Charge Your Car website.

Step
2



Register your debit or credit card to enable payment for charging.

Some charge points are free to use and some are pay to use. Register later using the app or now via the website.

Step
3



Purchase a Lifetime Card.

Use the RFID (Radio Frequency Identification) card to access and pay at all of the charge points on the network. Order your Lifetime Card after you have registered your debit or credit card. Price £10.

Step
4



Charge Your Car.

You are now ready to start using the network. If you need any assistance when charging call the Charge Your Car Helpline on 01912650500.

Funding Mechanism

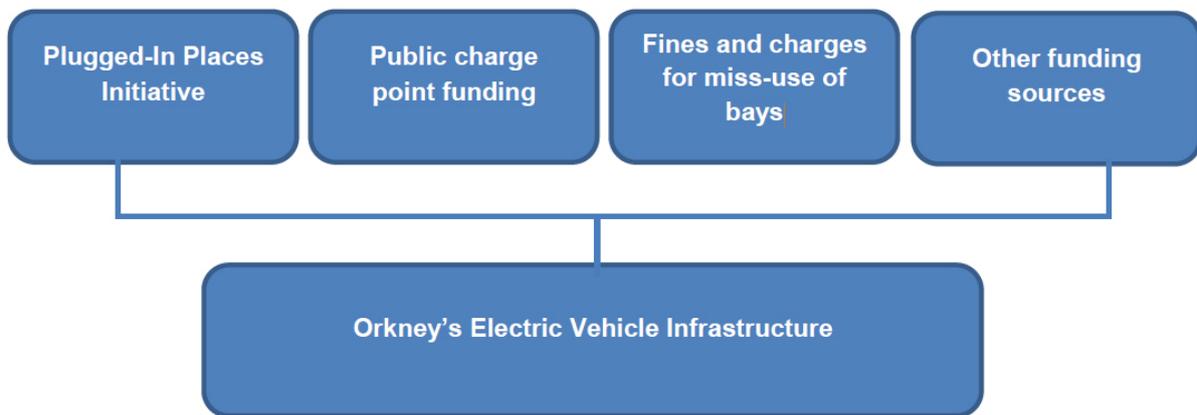
It is acknowledged that the majority of electric vehicle charging will be made at home and in the workplace and that this will be controlled by individuals and organisations.

Funding of rapid charge points across the county and fast chargers for workplace or long-stay locations are subject to external funding and may require match funding support from the Council.

By developing an electric vehicle infrastructure network across Orkney, it is acknowledged that this will result in additional staff resources within the Council to manage effectively and therefore the strategy requires the full support of the Council in order to reach the aims and objectives outlined.

It is envisaged that the Orkney-wide electric vehicle charging network infrastructure will be funded in the following way:

Figure 3.8: Potential Funding Mechanism.



By ensuring that the charging infrastructure is accessible and compatible, the aim is to create a fit for purpose network for Orkney as outlined in Figure 3.9 below.

Figure 3.9: Orkney Vision for Electric Infrastructure.

Orkney Vision
• All charging infrastructure to be compatible with Charge Your Car cards (or equivalent).
• All accessible charge points across the county to have the locations marked on the Charge Your Car website.
• Standard Charge point connectors.
• Rapid of fast charge points in 'hub' locations.

Benefits of the Strategy

The mass introduction of electric vehicles to Orkney has the potential to support the goal within the Climate Change (Scotland) Act 2009 of almost complete decarbonisation of road transport by 2050. The principles within the strategy aim to make Orkney a greener, cleaner, nicer place to live, work and enjoy.

Energy Systems

Electric vehicles recharged with 'green' electricity offers significant opportunities to achieve carbon reduction benefits.

The strategy gives consideration to the energy created in Orkney through renewables and the current issues related to curtailment. At peak times of production 5MW of renewable energy cannot be absorbed into the grid and it has to be 'switched off' at certain times, costing the local economy several million pounds per annum.

Currently, 75% of the electricity used in Orkney comes from renewable sources. If the curtailed energy could be used to power electric vehicles on the island, this would then result in a zero-carbon transport model. With typically short day-to-day journeys and the potential to have an accessible charging infrastructure network across Orkney, we are ideally placed to lead the way in promoting and encouraging electric vehicles across the county.

This concept meets with the Scottish Government's commitment to achieve 100% of Scotland's electricity demand equivalent from renewables by 2020.

Emissions

Transport is the most dominant source of emissions and air pollutants today, both of which are linked with negative health effects and environmental damage.

Orkney has one of the highest car ownership rates in Scotland, and therefore, it is important to encourage the adoption of electric vehicles instead of the petrol/diesel models that are damaging to our health and environment.

To take this one step further, low emission ferries will be considered by the Council as part of the ferry replacement programme. The Council will also continue to promote other sustainable transport modes such as walking, cycling and the use of public transport as a means to reduce emissions in Orkney.



Air Quality

By encouraging the use of electric vehicles in Orkney instead of petrol/diesel models our air quality can be improved significantly.

The next school and public bus contract will include a 'low carbon innovation clause,' which will give the Council an opportunity to work with the successful contractors on low carbon transport concepts as and when grant funding opportunities arise.

Noise

Whilst noise of vehicles may not be a major issue in our rural parts, Kirkwall and Stromness are subject to heavy traffic use and therefore many residents are subjected to high noise levels, particularly at peak commuting times.

Electric vehicles are near silent, resulting in minimal noise pollution. Electric vehicles, therefore, have the potential to make our urban areas in Orkney nicer places to live, work and enjoy.

The benefits of the strategy in regards to emissions, air quality and noise will also meet with the targets outlined in the Low Carbon Strategy for Orkney.

Financial

The major financial benefit of electric vehicles is the lower fuel costs which are particularly beneficial in Orkney given the high petrol and diesel costs at the pump compared with an electric vehicle charge which can be low as 2p per mile.

For an annual mileage of around 5,000 miles per year, switching from a conventional to an electric car or van could save you around £1,000 per annum in fuel costs alone (Based on £1.41.4 per litre for diesel in Orkney and average of 30 miles per gallon). Electric cars are also exempt from road tax and often benefit from lower car insurance rates. Home charge points are also currently 100% grant funded.

The price to purchase an electric vehicle is coming down with costs starting at as little as £13,000 (<http://www.energysavingtrust.org.uk/>). Government subsidy of £2,000 to £5,000 per vehicle is also offered to offset a large extent of the upfront premium. During the lifespan of the vehicle considerable savings could therefore be passed back to the user.

There are a number of reasons to encourage mass introduction of electric vehicles to Orkney, including health, environmental and financial benefits, which ultimately achieve the goal of making Orkney a greener, more sustainable place to live.



Next Steps

This strategy represents phase 1 of the development of electric vehicle charging infrastructure across Orkney. For the strategy goals, actions and objectives to come to fruition will require the participation and joint-working of all key stakeholders. This strategy for Orkney will evolve as charging technology develops.

Figure 5.1: Summary of Actions.

Key element of strategy	Details	Timeframe
Policy Frameworks.	Orkney's Electric Vehicle Infrastructure Strategy to be Council approved.	September 2014.
	Strategy to form part of other key Council documents.	September 2014 onwards.
Vehicles.	Proposed Orkney EV Trial.	2014 / 2015.
	Funding towards electric vehicles for replacement Council fleet.	Ongoing.
	Funding opportunities for businesses and residents.	Ongoing press releases in local press to highlight grant funding available during 2014 / 2015 onwards.
	Grant funding opportunities for low carbon public transport.	Officers continue to investigate.
Infrastructure.	Orkney 'hubs' - Phase 2.	2014 / 2015 – 2015 / 2016.
	Orkney 'hubs' - Phase 3.	2015 / 2016 > beyond.
	Additional infrastructure network across Orkney.	Future infrastructure subject to funding.
	Pricing mechanism for use of electric charge points.	January 2015.
	Restrictions for use of electric charging bays in key locations.	January 2015.
	Funding towards charging infrastructure.	Ongoing – largely through the Plugged in Places initiative.
Communication and Education.	Promotion of electric vehicles to businesses and residents.	Ongoing events during 2014 / 2015 onwards.
	Training opportunities for mechanics or trainees to provide maintenance for electric vehicles.	Subject to external funding.

Orkney's Electric Vehicle Infrastructure Strategy shall therefore remain a 'living' document.

Key Principles

As outlined in the strategy, the key principles for the Council to consider and action are:

Table 6.1: Key principles of strategy.

Key Principles	
Policy Frameworks.	For the promotion and consideration of electric vehicles to be embedded in all relevant Council strategy and policy documents.
Vehicles.	That the Council will give first consideration to the purchase of an electric vehicle when purchasing new or replacement roads' fleet whenever it is reasonably practical to do so.
Infrastructure.	The Council will support the installation of charge points in all public car parks, and Council property where reasonable, affordable and practicable to do so.
Infrastructure.	The Council will establish a policy for implementing a charging mechanism for use of electric infrastructure and management of electric vehicle parking bays in line with national policy and trends.
Communication and Education.	The Council will support projects which will encourage and facilitate the use of electric vehicles in Orkney.
Communication and Education.	The Council will continue to promote the use of electric vehicles through the use of press announcements and organised public events.



Further Information

Charge Your Car.	http://chargeyourcar.org.uk/
Charging Points.	http://www.thechargingpoint.com/
E-Cosse.	http://www.e-cosse.net/
Element Energy.	http://www.element-energy.co.uk/
Energy Saving Trust.	http://www.energysavingtrust.org.uk/
Greener Scotland.	http://www.greenerscotland.org/
HITRANS.	https://www.hitrans.org.uk/
My Electric Avenue.	http://www.myelectricavenue.info
Next Green Car.	http://www.nextgreencar.com
Orkney Marine Renewables.	http://www.orkneymarinerenewables.com/
Orkney Renewable Energy Forum.	http://www.oref.co.uk/
Scottish and Southern Energy.	https://www.sse.co.uk/home
The Green Car.	http://www.contracthireandleasing.com/thegreencarwebsite
Transport Scotland.	http://www.transport.gov.scot/

For further information on electric vehicles or infrastructure in Orkney please visit:

<http://www.orkney.gov.uk/>