



From mountain to sea

Low Emission Vehicle Delivery Plan

October 2018



Introduction

This Low Emission Vehicle Delivery Plan has been prepared to clearly set out how Aberdeenshire Council will deliver infrastructure and soft measures to support a greater uptake in Low Emission Vehicles across the area.

Designed to support the Councils Local Transport Strategy aims and objectives centred around 'Effective Travel' and effective car use, the delivery plan identifies measures to better promote eco driving, car sharing and importantly develop the infrastructure to support the growth in electric vehicles.

This delivery plan sets out the background and context which supports the LTS objectives on Effective Travel, collating current national, regional and local policy information which support the delivery plan. Recognising that this is an evolving area, a snap shot of the Council delivered infrastructure has been included within the plan which has also assisted in formulating the delivery proposals of new infrastructure, bolstering the provision at well used sites and plugging gaps in the network as it exists at the time of publication.

With the market in EV's growing quickly and technological advances being made at a fast pace, it is intended that this plan will be the first of several over the coming years, each with a relatively short implementation phase, which will afford Aberdeenshire Council the flexibility to evolve and deliver as these advances come to fruition.

1. Background Information

1.0.1 Private vehicle ownership is higher in Aberdeenshire when compared to the average for Scotland and for the United Kingdom as a whole. As illustrated in Table 1.1, there are 0.89 licensed vehicles per head of the 17+ aged population in Aberdeenshire, compared with 0.66 in Scotland and 0.73 in the United Kingdom. This can be attributed to a number of factors including the area's large rural population that is often reliant on vehicular transport.

Table 1.1: Licensed vehicles per head of the population

Area	Total Licensed Vehicles 2016 ¹	Total Population 2016 ²	Population over 16 years of age	Licensed vehicles per head of 17+ aged population
United Kingdom	38,388,200	65,648,054	52,525,880	0.73
Scotland	2,918,900	5,404,700	4,431,920	0.66
Aberdeenshire	187,300	262,190	210,306	0.89

1.0.2 Of the total number of licensed vehicles in the Aberdeenshire area, only 250 were Ultra-Low Emission Vehicles (ULEVs) meaning that the vast majority of vehicles run on petrol and diesel. The emissions released from these vehicles impact adversely on the environment, especially in terms of poor air quality which can be harmful to human health.

1.0.3 Looking ahead to the future, it is clear that ULEVs will have a pivotal role to play in working towards targets for the reduction of greenhouse gas emissions associated with the transportation sector. This strategy has been developed to realise a way forward for ULEVs in the Aberdeenshire area.

1.1 Policy Context

National

1.1.1 The Climate Change (Scotland) Act 2009 sets out a long-term target for the reduction of greenhouse gas emissions in Scotland. The target detailed in this act is for an 80% reduction in emissions from the 1990 level by 2050, with an interim target of 42% reduction by 2020. The delivery plan published in June 2009, 'Meeting Scotland's Statutory Climate Change Targets', recognises the importance of reducing emissions produced by the transportation sector and aims for 'almost complete decarbonisation of road transport by 2050 with significant progress by 2030'. In working towards this aim, the Scottish Government will promote the development, uptake and use of electric vehicles.

¹ DFT Vehicle Statistics Table Veh0105

² Office for National Statistics – Population Estimates for UK, England and Wales, Scotland and Northern Ireland: Mid-2016 Table MYE2

- 1.1.2 As detailed in the Draft Third Report on Policies and Proposals, released in January 2017 as part of the Climate Change Plan (CCP), the Scottish Government aims for the reduction of transport-related emissions by 32% compared to the 2014 level. It states that this will be achieved through widespread uptake of low emission vehicles, enhanced freight logistics and other measures such as low emission zones.
- 1.1.3 'Making the Connection: the Plug-In Vehicle Infrastructure Strategy' was published by the Government in 2011. This strategy outlines a framework for the development of recharging infrastructure to support plug-in vehicles in the UK. Detailed in this strategy is a number of ways that the Government aims to support market growth including grants, favourable tax regimes and pilot projects installing and trialling recharging infrastructure. It is the vision of the Government that the majority of recharging will take place overnight at home when electricity demand is off-peak, with the support of workplace recharging for commuters and fleets. It is recognised that a targeted amount of public infrastructure will also be required where it will be most used.
- 1.1.4 'Driving the Future Today: A Strategy for Ultra-Low Emission Vehicles in the UK' was published by the Government in 2013. This strategy discussed the UK targets for carbon reduction, noting that road transport will require to be essentially decarbonised by 2050. To achieve this, every new car and van sold in the UK from 2040 will need to be a ULEV. The benefits of such a shift are discussed and include a more secure and diversified supply of energy for transportation; the UK being at the forefront of the development and supply of ULEVs; and quiet, cleaner towns and cities. The Government pledges to work towards the following five workstreams: supporting the early market; shaping the required infrastructure; securing the right regulatory and fiscal measures; investing in UK automotive capability; and preparing the energy sector.
- 1.1.5 'Cleaner Air for Scotland: The Road to a Healthier Future' was published by the Scottish Government in 2015. The vision of the Scottish Government is that Scotland's air quality will be the best in Europe. The mission, through improved air quality, is to protect and enhance health, wellbeing, environment, placemaking, and sustainable economic growth. It is recognised that it will take more than reducing the volume of traffic and the number of journeys to reduce transport emissions to an acceptable standard. Included within the suggested strategies for reducing emissions is encouraging the uptake of ULEVs.
- 1.1.6 As stated in the Scottish Planning Policy 2014, charge points should be considered as part of new developments. Permitted rights were introduced in 2014 to allow development of on and off road charge points (with restrictions) without the need to apply for planning permission.

Regional

- 1.1.7 Nestrans launched the Regional Transport Strategy Refresh 2013-2035 in early 2014. This is a refreshed version of the document initially published in 2008, which takes into account policy changes and changes to the economic context within which the strategy sits. The vision of the Regional Transport Strategy (RTS) is a transport system for the north east of Scotland which enables a more economically competitive, sustainable and socially inclusive society. Environmental issues are discussed under Strategic

Objective 3, including the importance of reducing the effects of transport on climate, noise and air quality. There are currently three Air Quality Management Areas (AQMAs) in Aberdeen City: City centre, Wellington Road, and Anderson Drive. There are no AQMAs in the Aberdeenshire region.

Local

- 1.1.8 The latest version of the Local Transport Strategy (LTS) for Aberdeenshire was produced by the Council in January 2012. The guiding principle of this LTS is to encourage individuals and businesses to consider ways to travel **less**, travel more **actively** and where vehicular travel is necessary, how journeys could be made more **effectively**. Under the category of travelling effectively is 'Effective Car Use'. The objective associated with effective car use is to support initiatives that reduce single-occupancy car journeys and encourage the use of more efficient vehicles. The Council expresses a keenness to support new local carbon vehicle initiatives and implement associated infrastructure where appropriate and feasible.

1.2 Technology

- 1.2.1 In recent years, ULEV sales in Scotland have continued to grow year on year. From the beginning of 2012 to Q3 in 2017, the number of licensed ULEVs increased from 116 to 6,370, accounting for 0.21% of all licensed vehicles in Scotland (*DFT Vehicle Statistics Table Veh0131, Veh0104*). At the end of 2016, 250 ULEVs were licensed in Aberdeenshire, accounting for 0.13% of all vehicles licensed in the area (*DFT Vehicle Statistics Table Veh0131, Veh0105*).

- 1.2.2 There are currently four types of ULEVs as per the following:

- Battery Electric Vehicles (BEVs) – these vehicles are run entirely by an electric motor, which is powered by a battery that can be plugged into the mains. There is no combustion engine and there are no tailpipe emissions from these vehicles. On a single charge, BEVs can travel between 100 and 300 miles.
- Plug-In Hybrid Electric Vehicles (PHEVs) – these vehicles have both an electric motor and a conventional engine. In most models of these vehicles, the battery is still sufficient to cover beyond the average trip length (20-40 miles). This means that when the battery power has been fully utilised, the vehicle will continue its journey powered by the conventional engine.
- Extended-range Electric Vehicles (E-REVs) – these vehicles have a plug-in battery pack, an electric motor and an internal combustion engine. In an E-REV, the electric motor always drives the wheels, with the conventional engine acting as a generator to recharge the battery when required. These vehicles can run entirely on electricity for up to 125 miles.
- Hydrogen Fuel Cell Electric Vehicles (FCEVs) – these vehicles have a fuel cell stack which uses hydrogen to produce electricity to power the vehicle. The fuel cell does not need recharging; it will continue to generate power provided it is fed with a supply of oxygen. FCEVs can be refuelled at a filling station as you would with a conventional

petrol or diesel vehicle. These vehicles can travel approximately 300 miles before refilling is required.

1.2.3 In terms of EV charging, the following power levels are available:

- Slow (3kW) – these chargers are the oldest standard and most often use the standard 3-pin plug. It typically takes between 6-12 hours to fully charge an electric vehicle at one of these points. Many local authorities are phasing out these chargers due to the slow charging speeds. There are no slow charging points in the area that are operated by Aberdeenshire Council.
- Standard (7kW) – these chargers are newer and can fully charge an electric vehicle in 2-5 hours. They deliver alternating current (AC) from the mains to the vehicle's on-board transformer where it will be converted to the direct current (DC) that the battery needs. There are currently nine standard chargers operated by Aberdeenshire Council, including at the following locations: Inverurie Gordon House; Inverurie Burn Lane; Peterhead Buchan House; Stonehaven Market Square; Turriff High Street and Aberdeen Woodhill House.
- Fast (22kW) – these chargers can fully charge an electric vehicle in 1-2 hours. As per the standard power level, they deliver AC from the mains to the vehicle's on-board transformer where it is converted to DC that the battery needs. There are currently 21 fast chargers operated by Aberdeenshire Council in the area, including at the following locations: Aboyne Craigwell Depot; Ballater Church Square; Banchory Bellfield Car Park; Bridge Street Car Park; Braemar Balnellan Road; Ellon Station Road Car Park; Ellon Park & Ride; Huntly Market Muir Car Park; Inverurie Burn Lane; Inverurie Harlaw Depot; Laurencekirk Robson Street; Macduff Depot; Mintlaw Depot; and Westhill Library.
- Rapid (50kW) – these chargers deliver charge straight to the vehicle's battery. They have a built in transformer to convert the AC from the mains electricity supply to the DC required by the vehicle's battery. It typically takes around half an hour to charge an electric vehicle to 80% at one of these points. There are currently 11 rapid chargers located in the Aberdeenshire area including at the following locations: Aboyne Station Square, Alford Village Car Park; Braemar Balnellan Road; Ellon Park & Ride; Fraserburgh Seaforth Street; Huntly Nelson Street; Inverurie Burn Lane; Laurencekirk Robson Street; Peterhead Lido Car Park; and Stonehaven Station Car Park.



Figure 1.1: Example of a standard charging point (7kW)



Figure 1.2: Example of a fast charging point (22kW)



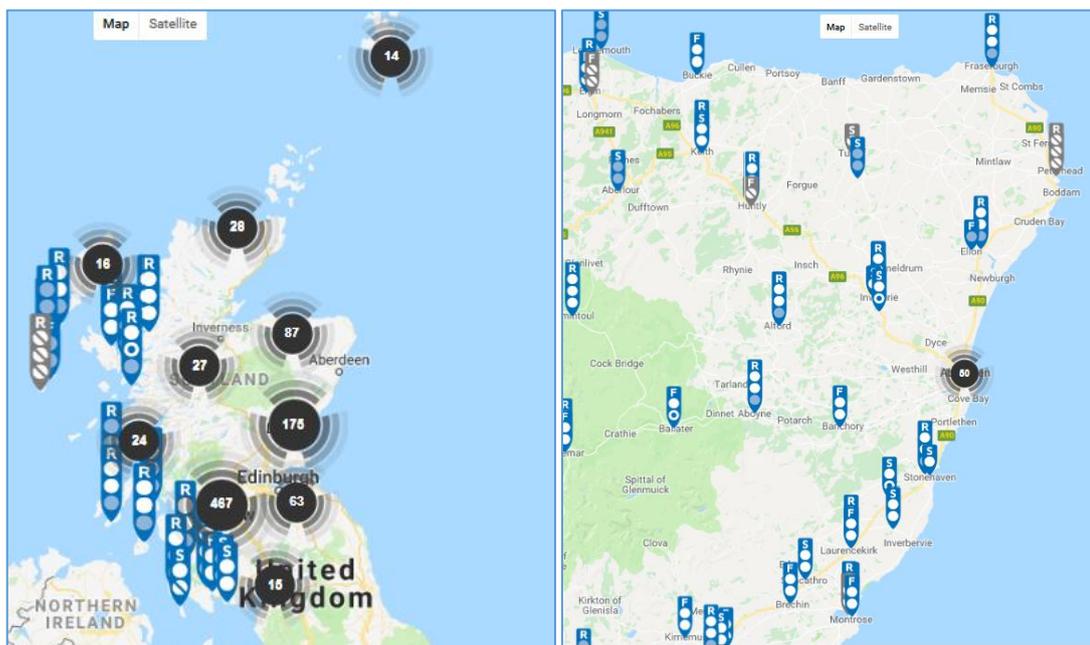
Figure 1.1: Example of a rapid charging point (50kW)

2. Today's Picture

2.1 Current situation in Aberdeenshire

2.1.1 At present, there are 41 charging points for EV owners and users operated by Aberdeenshire Council, as illustrated in the map below. In addition to these points, there are a number of other charging points across the area with different operators. These tend to be owned by private companies that have charging points available for staff and/or customers.

2.1.2 As the national host, Chargeplace Scotland run the back office functions for the EV charging infrastructure on behalf of The Scottish Government. The [Chargeplace Scotland](#) website provides up to date user information for users of the charge points, indicating faults, availability and facility available.



2.1.3 The map below has been prepared by Aberdeenshire Council and is useful for plotting and planning installation sites; considering network gaps and charging opportunities. It should be noted that the map identifies locations and not necessarily all the charging facilities available at that location. Table 2.1 provides a full inventory of the sites installed by Aberdeenshire Council.

Table 2.1 provides further details about the charging network in the area.

Table 2.1: Current electric vehicle charging network operated by Aberdeenshire Council

Town	Location	Type	Outlet	Number of Parking Spaces
Aboyne	Station Square Car Park	Rapid	50kW	2
Aboyne	Craigwell Repair Depot	Fast	22kW	2
		Fast	22kW	2
Alford	Village Car Park	Rapid	50kW	2
Ballater	Church Square	Fast	22kW	2
Banchory	Bellfield Car Park	Fast	22kW	2
Braemar	Balnellan Road	Rapid	50kW	2
Braemar	Balnellan Road	Fast	22kW	2
Ellon	Station Road Library Car Park	Fast	22kW	2
Ellon	Park & Ride	Rapid	50kW	2
		Fast	22kW	2
Fraserburgh	Seaforth Street	Rapid	50kW	2
Huntly	Market Muir Car Park	Fast	22kW	1
Huntly	Nelson Street Car Park	Rapid	50kW	1
Inverurie	Gordon House	Standard	7kW	1
Inverurie	Burn Lane Car Park	Rapid	50kW	2
		Standard	7kW	1
		Standard	7kW	1
		Rapid	50kW	2
		Fast	22kW	2
		Fast	22kW	1
Inverurie	Harlaw Repair Depot	Fast	22kW	2

		Fast	22kW	2
		Fast	22kW	2
Laurencekirk	Robson Street Car Park	Rapid	50kW	2
Laurencekirk	Robson Street Car Park	Fast	22kW	2
Macduff	Macduff Repair Depot	Fast	22kW	2
		Fast	22kW	2
Mintlaw	Mintlaw Repair Depot	Fast	22kW	2
		Fast	22kW	2
Peterhead	Buchan House	Standard	7kW	1
Peterhead	Lido Car Park	Rapid	50kW	2
Stonehaven	Station Car Park	Rapid	50kW	2
Stonehaven	Market Square	Standard	7kW	1
Turriff	High Street	Standard	7kW	1
Westhill	Westhill Library	Fast	22kW	Pending
		Fast	22kW	Pending
Aberdeen City	Woodhill House	Standard	7kW	1
		Standard	7kW	1
		Standard	7kW	1

2.1.4 Since the first recorded charging session in September 2013, electric vehicle charging events in Aberdeenshire have increased dramatically. As shown in Figure 2.2, there has been a growth from 88 throughout 2013 to 12,804 throughout 2017.

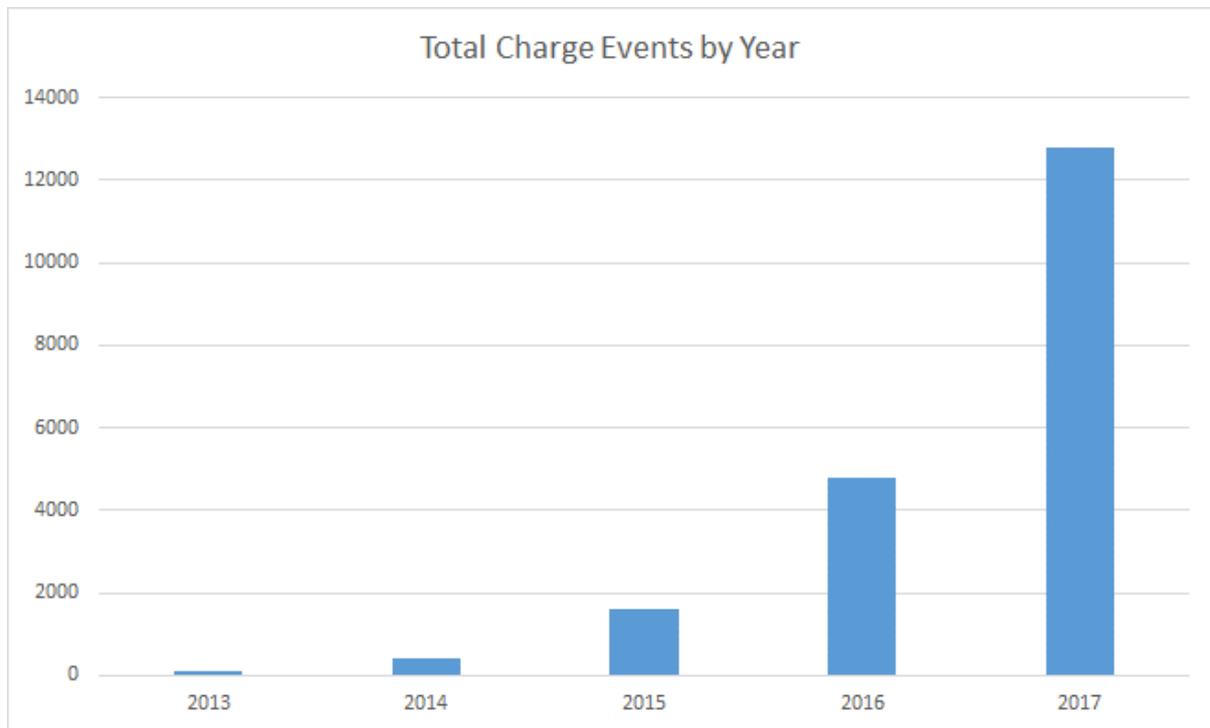


Figure 2.2: Breakdown of charge events by year 2013-2017

2.1.5 Figure 2.3 on the following page gives an overview of usage across the Aberdeenshire charging estate. It should be noted that the graph does not include all the charging points listed in Table 2.1, rather only the ones for which usage statistics existed at the end of 2017. In order to show meaningful comparisons, the graph shows the average number of monthly charge events since the charging point was installed. As chargers were installed at different times, showing the total number of charge events would not convey an accurate representation of usage. As shown in Figure 2.3, the chargers with the highest usage on average are all rapid chargers, particularly the two at the Burn Lane Car Parks in Inverurie and the one at Stonehaven Rail Station. It would be expected that rapid chargers would have a greater number of charge events, both because more vehicles can be charged within a 24 hour period due to the faster charging times, and because people may be more inclined to use a rapid charger. In this regard, usage of the standard 7kW charger at Market Square in Stonehaven is high, with higher average usage than the rapid chargers in Aboyne, Alford, Braemar, Huntly, and Peterhead. This may suggest that there is an appetite for electric vehicles in Stonehaven.

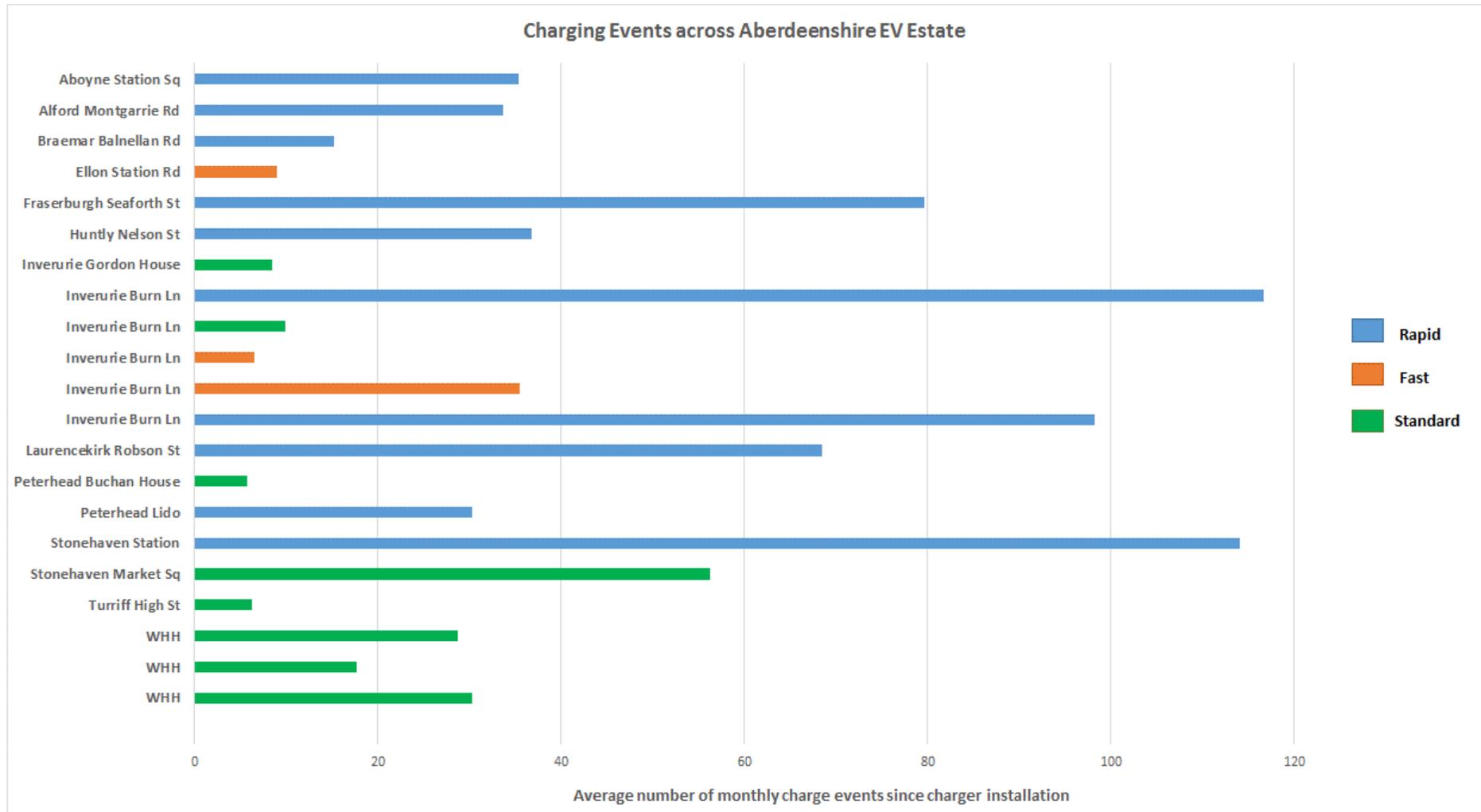


Figure 2.3: Average number of monthly charge events across Aberdeenshire Estate

2.1.6 Using Datashine, commuting routes were studied departing from the main towns and destinations were placed in a ranking system revealing the location of common journeys as shown below. This led to a map being created to show common corridors throughout Aberdeenshire which will require a charge point network in the future to reduce range anxiety of using EV's.

Table 2.2: Frequency of commuter journeys from Aberdeenshire towns (Datashine, 2018)

Town	Frequency of Journeys		
	High	Medium	Low
Alford	Aberdeen	Inverurie	Banchory
Ballater	Aboyne	Aberdeen	Banchory
Banchory	Aberdeen	Aboyne	Torphins
Banff	Macduff	Portsoy	Turriff
Blackburn	Aberdeen	Westhill	Cove
Ellon	Aberdeen	Newburgh	Pitmedden
Fraserburgh	Peterhead	St Fergus	Fraserburgh
Huntly	Kennethmont	Aberdeen	Keith
Insch	Aberdeen	Inverurie	Oldmeldrum
Inverurie	Aberdeen	Insch	Oldmeldrum
Laurencekirk	Aberdeen	Portlethen	Inverbervie
Macduff	Banff	Crudie	Turriff
Oldmeldrum	Aberdeen	Inverurie	Insch
Peterhead	Aberdeen	St Fergus	Fraserburgh
Portlethen	Aberdeen	Cove	Stonehaven
Stonehaven	Aberdeen	Portlethen	Inverbervie
Turriff	Aberdeen	Huntly	Inverurie
Westhill	Aberdeen	Alford	Inverurie

Table 2.2: Frequency of trips on Aberdeenshire roads based on EV commuter journeys from Aberdeenshire towns (Datashine, 2018)

Road	Frequency of trips on road
A90N	9
A90S	13
A96	12
A97	7
A947	6
A944	5
A93	4
A920	3
B993	4
B9077	2
B9024	1
B9119	1
B9117	1
B9002	1
B979	1

3. Challenges and Barriers to Uptake

3.0.1 Despite increasing numbers of ULEV owners and users in recent years, there are a number of challenges to consider and barriers to widespread uptake that need to be overcome. These can be generally be split into technical challenges and those relating to public perception.

3.1 Technical Challenges

3.1.1 As demand grows for ULEVs, it will become increasingly necessary to consider the role that on-street charging facilities will have for those without access to off-street parking. This presents a series of issues that should be considered as per the following:

- Marked bays – where charging infrastructure is implemented on-street, it will be necessary to mark bays as ‘EV Only’ to ensure that owners and users have access to the charging points.³
- Location of charging equipment – it needs to be ensured that sufficient footway width remains after installing on-street charging infrastructure.⁴ One option that is being trialled in some locations is the retrofitting of street lights to include charging sockets.⁵
- Utilities – cables from utilities including gas, electric and telecommunications are often located underneath the footway and this may cause problems for the installation of charging infrastructure.⁶
- Heritage/Conservation areas – charging infrastructure that is to be implemented in such areas requires to be in-keeping with the character of the surroundings.⁷

3.1.2 With increasing numbers of ULEVs on the road, it is important to consider power requirements associated with an increase in demand for electricity. It is not expected that full-scale adoption of ULEVs will result in an entirely additional load on existing peak generating capacity as research suggests that the majority of people will charge vehicles overnight at home or whilst they are at work.⁸

3.1.3 Network size is another vital consideration – too few options for recharging is likely to hinder the expansion of ULEV ownership and discourage visitors; too many options will mean that parking spaces will be unoccupied for extensive periods and may lead to frustration for those who wish to park a non-electric vehicle.

³ London Borough of Richmond upon Thames, *Electric Vehicle Recharging Strategy 2016-2026*, 2016 https://www.richmond.gov.uk/media/10795/electric_vehicle_charging_strategy.pdf [accessed 8 November 2017]

⁴ *ibid.*

⁵ apse membership resources, *Briefing 17/38 Electric Vehicle Charging Infrastructure*, 2017 <http://apse.org.uk/apse/index.cfm/members-area/briefings/2017/17-38-electric-vehicle-charging-infrastructure/> [accessed 8 November 2017]

⁶ London Borough of Richmond upon Thames, *Electric Vehicle Recharging Strategy 2016-2026*, 2016 https://www.richmond.gov.uk/media/10795/electric_vehicle_charging_strategy.pdf [accessed 8 November 2017]

⁷ *ibid.*

⁸ Office for Low Emission Vehicles, *Driving the Future Today A strategy for ultra-low emission vehicles in the UK*, 2013 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/239317/ultra-low-emission-vehicle-strategy.pdf [accessed 15 November 2017]

3.2 Public Perception

- 3.2.1 From a consumer perspective, the upfront cost of purchasing a ULEV is a key barrier. Research commissioned by the UK's Committee on Climate Change (CCC) found that consumers value upfront costs far more highly than running costs. This means that consumers are unlikely to make purchasing decisions based on cumulative costs during the lifetime of a vehicle. In the report published in 2013, it states that without support measures, cost will remain a barrier until at least 2030.⁹ More recent research commissioned by Aberdeenshire Council suggests that cost will become less of an issue with an increase in the number of makes and models of ULEVs.
- 3.2.2 A common barrier to uptake of ULEVs is the issue of range anxiety – the idea that a vehicle will have insufficient range to reach its destination. It is commonly reported that higher capacity batteries and extensive roll-out of public charging infrastructure will alleviate this concern. The last two years has seen the introduction of vehicles with higher capacity batteries, including the Nissan LEAF released in 2016 with a range of 155 miles, and the new Renault ZOE released in 2017 which can deliver 250 miles on a single charge. Extensive distribution of charging infrastructure will give drivers reassurance that they can stop to top up the charge on their vehicles if required, especially when undertaking long journeys. As well as improving the overall distribution of public charging infrastructure, it is equally important to improve reliability of the charging network. As reported by apse in October 2017, Zap Map estimated that in June 2017, 13% (or one in eight) of charge points were out of action at any one time.¹⁰
- 3.2.3 Relative to conventional petrol and diesel vehicles, the range of ULEV models is fairly limited, although improving all the time. Choice is related to vehicle segment and brand – vehicle segment is based on consumer preference in terms of size, comfort and practicality; brand choice relates to brand loyalty where vehicle buyers limit the number of brands they would consider buying from. Research commissioned by the CCC in 2013 found that model diversity varies across different segments and EV types e.g. the outlook for BEVs is better than for PHEVs, and is better for cars than vans.¹¹
- 3.2.4 Another key barrier to the widespread adoption of ULEVs is lack of awareness, both of the vehicle technology and of the incentives associated with their purchase. In a survey commissioned by Aberdeenshire Council in 2016, the third most common barrier mentioned was a lack of awareness after upfront cost and suitability for individual needs. In addition to this, just over half of respondents to the survey were either unaware of public charging infrastructure in their area or disagreed that there was suitable charging infrastructure in their area.

⁹ Element Energy, *Pathways to high penetration of electric vehicles*, 2013 https://www.theccc.org.uk/wp-content/uploads/2013/12/CCC-EV-pathways_FINAL-REPORT_17-12-13-Final.pdf [accessed 9 January 2018]

¹⁰ apse membership resources, *Briefing 17/38 Electric Vehicle Charging Infrastructure*, 2017 <http://apse.org.uk/apse/index.cfm/members-area/briefings/2017/17-38-electric-vehicle-charging-infrastructure/> [accessed 8 November 2017]

¹¹ Element Energy, *Pathways to high penetration of electric vehicles*, 2013 https://www.theccc.org.uk/wp-content/uploads/2013/12/CCC-EV-pathways_FINAL-REPORT_17-12-13-Final.pdf [accessed 9 January 2018]

4. Opportunities

4.0.1 The development of ULEVs presents a variety of opportunities for the Aberdeenshire area and there are a number of reasons why Aberdeenshire is well placed to be at the forefront of widespread uptake.

4.1 Why Aberdeenshire?

4.1.1 Amongst other factors, the rural nature of the Aberdeenshire area means that there is a high dependence on the private car across the region. This is especially the case in terms of travel to work, with 71% indicating that they travel to work by car in the 2011 Census, compared to the Scottish average of 62.4%¹². This reliance on the private car is harmful to the environment and adversely affects air quality in Aberdeenshire and beyond, particularly in Aberdeen City where a significant proportion of residents travel to for work on a regular basis. For this reason, it is important to promote 'Effective Car Use' in line with the Local Transport Strategy – ULEVs provide the opportunity to maintain the level of convenience afforded by the private car, whilst not impacting the environment in an adverse manner.

4.1.2 Another reason why Aberdeenshire is well placed for a big push on ULEV technology is because of the relatively compact travel area. Origin destination data from the 2011 Census indicates that 41,228 people travel from Aberdeenshire to work in Aberdeen City – this is just under a third of the working population in Aberdeenshire. The compact travel area means that the vast majority of round trips from Aberdeenshire to Aberdeen City could be undertaken on a single charge.

4.1.3 Data from Charge Place Scotland shows that half of all charge events are currently undertaken by people who live out with the Aberdeenshire area. This suggests that Aberdeenshire's network of public charging infrastructure is facilitating tourism trips. There is an opportunity to capitalise on this tourist element through the North East 250.

4.2 Opportunities

4.2.1 Pool Cars

There are many options to provide a pool car fleet which includes free floating cars which can be used for one way journeys, a fixed location car club or peer to peer sharing of cars within Aberdeenshire.

4.2.2 Car Clubs

A car club involves a number of vehicles parked in designated bays within a town or city. Members can sign up to use all of the cars in the fleet on an hourly basis as required. An organisation valets the cars controls the online booking system. There are a range of car clubs including Co-Wheels and Enterprise Car Club which allow users access to vehicles in others cities with a car club. Car clubs use newer cars, with many being electric or hydrogen, which are highly energy efficient and therefore produce less emissions than private car ownership within the grey fleet.

¹² <http://www.scotlandscensus.gov.uk/ods-web/area.html> [accessed 30/01/2018]

4.2.3 Peer to Peer Car Sharing

Peer to Peer car sharing involves locals within a town or city advertising their car to be used by members of the local community. An organisation is involved in setting up a website and providing insurance to the users. The car owner takes payment for use of the car. The aim of peer to peer sharing is to make use of stationary cars in driveways and reduce the level of car ownership, which in turn, will reduce congestion. This is effective in smaller locations which may not be able to support the usual model of a car club.

4.2.4 Free Floating Car Club

A free floating car club allows cars to be used for one way trips without returning to the same location. Electric and hydrogen vehicles can be added to the fleet to reduce emissions. This model provides more flexibility to the usual car club and may encourage a multi-modal journey such as a combination of using an electric car club car and public transport.

By using electric or hydrogen pool cars, it will reduce emissions and the use of the grey fleet by Aberdeenshire Council. The Energy Saving Trust suggests that a car club can reduce business mileage by up to 30%¹³ and mileage is electronically recorded for each journey, due to the business mileage payments disappearing it is less of an incentive to drive to meetings and alternative transport choices are considered. A car club could be provided within a range of towns in Aberdeenshire for staff, but with the intention to develop a network for the public, to improve transport provisions within the rural areas. This will reduce congestion on the roads, save money and improve air quality.

4.2.5 Electric Fleet Vehicles

Fleet vehicles have a high buying power as they provide a large range of cars across Aberdeenshire. When upgrading the fleet vehicles, electric and hydrogen cars should be considered first where it is practical. This will have a large impact on the air quality and emission targets due to the reduction of emissions from heavy duty vehicles.

4.2.6 Community Vehicles Electric

This is an area where officer support could be provided to better inform communities of the options available for such vehicles. With a higher than normal capital outlay, the advantages of such vehicles would be related to lower running and maintenance costs.

4.2.7 Charging Network

There is future potential to increase the charge point network across Aberdeenshire. Charging will take place the majority of time at home and at the workplace while public charging will support electric vehicle range. New legislation within the Section 75 agreement could include a condition determining that all new developments must include a minimum of one or 5% charge points in relation to parking spaces.

¹³ Energy Saving Trust, *A Guide to Reducing Grey Fleet Mileage*, 2012
<http://www.energysavingtrust.org.uk/sites/default/files/A+guide+to+reducing+grey+fleet+mileage.pdf> [accessed 28/05/2018]

4.2.8 Home Charging

It is predicted that future charging sessions will take place overnight within houses that have access to off road parking spaces or garages, as this will be lower cost and reduce pressure from the grid to provide electricity. There is a possibility of EV owners charging their vehicle at night with lower cost rates and if all of the electricity is not used, selling it back to the grid during peak hours.

Those without access to off-road parking have less access to charge points close to their home. Lamppost charging could be developed beside on-street parking to give flat owners access to owning an electric vehicle. Another option is for agreements to be made with unused car parks in the evenings, such as supermarkets and offices, to provide EV charge point spaces. Providing public facilities for those in flats and houses in town centres without access to a driveway will encourage uptake of electric vehicles.

4.2.9 Workplace Charging

Workplace charging will be an alternative to charging at home, this will have lower installation costs than public charging points. Charging can be provided at off peak rates with staff using charge points during the day and fleet vehicles using the charge points at night. There will also need to be a balance between using electric vehicles and maintaining use of public and active travel.

4.2.10 Public Charging

The public charging network will initially be used as the main source of power before this is financially charged, it will then be used to top up electric vehicles throughout the day when required. Charge points will be located within sites of interest, major towns and connecting major routes to create a core network of charge points. The aim is to provide a well-connected network of charge points every 50 miles, as this will initially build uptake in EV's due to range anxiety concerns. The network can be built through use of public car parks and privately owned car parks such as supermarkets or offices. Charge points can be used to generate EV trips especially to sites which create their own electricity. There is potential to add to the existing charging network by providing additional fast chargers at popular locations to reduce anxiety of availability of charge points.

4.2.11 Electric charging hubs

An Electric Charging Hub is a location which provides a number of rapid charge points for use by the public or electric vehicle fleets. Three hubs have been approved for Dundee using OLEV (Office for Low Emission Vehicles) funding of £1.86m to provide charging hubs within the city, they will include rapid chargers with solar panels and battery storage to support the energy required¹⁴. There is also a future aim to provide E-Bike chargers on site, to encourage all sustainable electric modes of travel. There is potential to provide a similar style hub within Aberdeenshire to support the growth of electric vehicle within priority routes.

¹⁴ Drive Dundee Electric <https://drivedundeeelectric.co.uk/in-dundee/> [accessed 28/05/2018]

4.2.12 Parking

There is potential to make electric vehicle ownership more attractive through incentives. There is potential to allow EV's to use the bus lane which will reduce journey times and incentivise ownership of EV's. Parking could be provided for free for EV's within town centres to encourage uptake, this could include a green badge scheme placed on the dashboard to make the free parking seamless. EV spaces could be marked out clearly in car parks to provide the best spaces as this will also incentivise ownership.

4.2.13 Electric Taxi fleet

Electric taxis could be introduced as low emission vehicle alternative mode of transport. By way of example, a fleet of some 60 Nissan Leaf cars make up one of the UK's largest taxi fleets running on electricity. Operating within Dundee City, this is a model which could be adopted in some of the areas larger towns, accepting that range may be an issue in rural areas.

4.2.14 E-bikes

Now in its third year of operation, Aberdeenshire Council has been running a successful E-Bike loan scheme which allows staff to trial the bike for a month while recording their journeys in a travel diary. This provides carbon offset emission data for each of the E-Bikes. This project could be expanded upon the current 4 bikes to provide more E-Bikes stationed at all offices for use when required for meetings.

There is potential to provide a public bike hire scheme within Aberdeenshire to encourage behaviour change. This could take various forms, including docking stations where bikes are picked up and dropped off at stations or another option is to suggest bikes are dropped in a set area with or without docking stations which will increase credit on the bike hire account. Modular movable stations could be incorporated as they can be removed in winter when cycling decreases or moved to more frequently used sites.

4.2.15 Development of a Hydrogen economy

Aberdeen City and Aberdeenshire Council are involved in the Hytrec2 European project which aims to encourage take up of green transport in the form of Hydrogen Fuel Cell Electric Vehicles (FCEV). FCEV's have a longer range which is beneficial in a rural location, although more Hydrogen Refuelling Stations (HRS) will need to be constructed before this technology can be embedded.

Other European countries are leading on hydrogen technology, Germany is creating a country wide network of HRS with an aim to develop 400 by 2023, linking major towns together. Shell are integrating hydrogen refuelling within petrol stations in Germany to make the refuelling process seamless similar to petrol.

Denmark is the first country to provide a country wide hydrogen network with 10 HRS and all of the hydrogen production from on-site electrolysis or centralised electrolysis. There is an aim to provide a HRS every 90km between densely populated locations to provide range for hydrogen vehicles.

There are a range of opportunities hydrogen technology can bring to Aberdeenshire including developing existing petrol station infrastructure to provide hydrogen

refuelling. At present the following high profile projects are being developed across the world:

- Germany – 400 Hydrogen stations by 202
- Scandinavian Hydrogen Highway Partnership
- Japan 80 new stations in the next 4 years
- Sweden – 8 new stations by 2020 already 4 stations
- Denmark 11 stations – highest density per capita

4.2.16 Engaging with young people

Engagement with school age pupils is already being progressed, utilising lesson plans developed by the Council under the 'Embedding Active and Sustainable Travel into Education' (EASTiE) resource pack. These lesson plans link to the Curriculum for Excellence and are design for teaching staff to deliver on CofE objectives while promoting the sustainable message. Council officers supplement this work by carrying out workshops with schools demonstrating battery, hydrogen, solar and wind power to drive model cars. The workshops culminate with a demonstration of an Electric Vehicle and a question and answer session.

It is the aim of this programme to equip the next generation with the knowledge to inform adults and embed the principles at an early age of renewable energy and low carbon transport.

5. Gap Analysis

5.1 The Existing Network Gaps

Following a review of the existing network – sites identified in 2.1.2 – it is apparent that in the short term, the A947 corridor remains weak in terms of EV charging opportunities. Given that the corridor connects a number of larger communities, providing charge points along this strategic route would be beneficial.

5.2 Fleet Charging

The Council is already seeing a number of electric vehicles being introduced to the pool of fleet vehicles. It is anticipated that as the range and ability of electrically powered commercial vehicles increases and improves, there will be more demand for these vehicles to be introduced to the fleet.

While an initial phase of depot charge points has been delivered, a second phase of delivery will include the introduction of Rapid charging units to be installed at the larger depots as part of the ‘Super Depot’ programme.

5.3 Bolstering the Existing Network

As range batter technology improves and the technology becomes more tried and tested, the ownership of Electric Vehicles is moving away from the ‘early adopter’ phase and into the ‘early majority’ phase of ownership. With this move, issues of range anxiety will be seen to give way to charge anxiety.

Feedback from a number of Scottish Government hosted workshops has concluded this to be the case and nationally, many of the existing rapid charge sites are now being augmented with new additional units to address the anticipated demand.

Moving forward, the Council should work with Transport Scotland to increase the number of charging units at the most frequently used sites and consider the roll out of EV charging hubs.

5.4 Education and Awareness

While the technology can now be seen to be moving into the wider market place, awareness of EV’s and the technology still remains low. As individuals become more aware of EV’s there is a greater demand to provide up to date and relevant information. There is an appetite amongst a growing number of drivers to consider an EV as their next vehicle choice; without adequate information this decision could be delayed for a further period of car renewal.

Anecdotal evidence suggests that the knowledge and awareness of local dealerships can be poor and this can impact on sales of new EV’s. A campaign to engage with and work with local dealers advising on the charging network available in Aberdeenshire could be a way to address this gap.

6. Delivery Plan

6.1 Vision

6.1.1 In 2013, the UK's Committee on Climate Change (CCC) set high EV uptake targets as detailed in the report 'Pathways to high penetration of electric vehicles' authored by Element Energy, Ecolane Consultancy and the University of Aberdeen. As detailed in this report, targets include:

- EVs make up 9% of new vehicle sales in the UK by 2020 (0.27 million annual sales);
- EVs make up 60% of new vehicle sales in the UK by 2030 (2.1 million annual sales);
- Cumulative fleet of 13.6 million electric cars and vans on UK roads by 2030

The vision of Aberdeenshire Council is to support these aims on a geographical basis.

6.2 Aims and Objectives

6.2.1 The objective of the delivery plan is to support the national approach on Low Emission Vehicles, cementing Aberdeenshire's place as a proactive authority in support of Carbon reduction, air quality improvements and technological innovation.

This will be achieved by ensuring that the Council aims to provide a robust charging network capable of addressing range and charge availability anxiety amongst EV drivers.

The Council will aim to engage with business and communities to promote the technologies and will continue to link awareness sessions with the work currently undertaken in schools.

With a wide range of benefits associated with the Council's own fleet adoption of electric vehicles, the Council will aim to further augment the existing EV fleet and support this with charging infrastructure.

6.3 Delivery Actions

6.3.1 This delivery plan has been designed to set out how Aberdeenshire Council will support electric vehicle up take over a short term period of typically 2-3 years. It has been developed in this way due to the constantly evolving network and improvements in technology. The plan will be revisited on a bi-annual basis and amended to reflect changes in the market place and provide an update on the Council's progress in supporting low emission vehicles.

- Action 1 – Create a robust charging network along the A947 Corridor to support the local communities of Banff, Turriff, Fyvie, Oldmeldrum and Nemachar.

Delivery: 2018- 2020

Funding: Scottish Government

- Action 2 – Roll out of Rapid 50kW EV charging units into the Councils ‘Super Depots’ as these depots are completed. Review recently installed units and determine any areas of high demand and support these sites with additional 22kw units.

Delivery: 2019-2020

Funding: Low Carbon Initiatives

- Action 3 – Review the existing charging network and determine areas of greatest demand. These charging sites will be supplemented with additional charging units to bolster existing supply, considering a Hub type of facility.

Delivery: 2019/20

Funding: Scottish Government via Travel Hub Grant or similar.

- Action 4 – Continue to seek opportunities to promote Electric Vehicles using a variety of media channels (adopting the GetAbout branding). Promote EV’s alongside other sustainable and active travel events. Engage with local dealerships to provide up to date information on charge points and the Councils delivery plan.

Delivery: 2019/20

Funding: Smarter Choices Smarter Places

Appendix One

Useful Links

<http://www.energysavingtrust.org.uk/transport/electric-vehicles>

<https://chargeplacescotland.org/>

<https://www.gov.uk/plug-in-car-van-grants/what-youll-get>

<https://www.goultralow.com/>

<https://www.gov.uk/government/collections/government-grants-for-low-emission-vehicles>