Agenda Item	**12**
Report No	**CP/19/21**

HIGHLAND COUNCIL

Committee: **Communities and Place**

Date: 12 May 2021

Report Title: **Developing the approach to decarbonising the Large Good Vehicle fleet**

Report By: Executive Chief Officer Communities and Place

1. Purpose/Executive Summary

1.1 An approach to decarbonising the Large Goods Vehicles (LGV) fleet is required:

- to contribute to the wider Highland Council ambition for the region to become carbon neutral by 2025; and
- to comply with the Scottish Government target that local government decarbonise the fleet by 2030 and move to Ultra Low Emission Vehicles (ULEV).

1.2 The Council currently operates a large fleet of approximately 240 vehicles, 225 registered on the HC operator's licence and 15 dedicated winter maintenance vehicles not registered on the licence.

1.3 The Council is committed to actively reducing the impact of its activities on the environment in line with the Scottish Government's ambition to end Scotland's contribution to climate change by 2045, and this is also reflected in our ambitious, sustainable and connected corporate values.

1.4 The approach outlined to decarbonising the fleet is a two phased approach focusing initially on cars and light commercial vehicles. This was agreed at the Community and Place Committee on 25 November 2020. Further phases include a review of LGV operated by the Council, and consideration of how Council targets will be reflected in contracts awarded to contractors and suppliers in their use of fleet.

2. Recommendations

2.1 Members are asked to note:

i. the national target set by local government to decarbonise fleets of cars and light commercial vehicles by 2025 and large goods vehicles by 2030 with the Council's target for the region to be carbon neutral by 2025.

ii. from 2012/13 – 2019/20, emissions arising from Council fleet vehicles' use of petrol, diesel and gas oil has decreased from 9,166tCO2e to an estimated 8,454tCO2e, a reduction of just under 8%. There has been a corresponding reduction in consumption of diesel by the fleet of approximately 315,000 litres, or 10%, over the same timeframe,

iii. the Council has taken part in a study with other Councils and public sector partners to assess the optimum vehicle type for our various operations. This shows a shift to EV and hydrogen fuelled vehicles would be suitable for operations, although some petrol/diesel vehicles are likely still to be required due to distances travelled and rural challenges.

iv. the challenges around greening the LGV fleet are:
    a. higher costs of procuring Ultra Low Emission Vehicles (ULEV) LGV. The cost of LGVs powered by electric and hydrogen remain prohibitively high. Generally, electric vehicle (EV) costs are double and hydrogen costs are treble the cost of diesel vehicles;
    b. many manufacturers are still at the prototype stage and this makes whole life costing, including estimating residual value of vehicles, difficult to predict;
    c. while costs are expected to fall as technology improves and take up increases, budget provision and external funding are not yet identified to meet decarbonisation targets. However, work is underway to quantify the costs for a phased replacement programme and to identify all potential funding sources to inform future budget setting; and
    d. identifying a sustainable and secure supply of hydrogen is at an early stage. Potential providers are testing the market, trying to understand and estimate demand, before committing to investing in the region, although much work is being done by various organisations to produce, transfer and supply hydrogen.

v. The opportunities being pursued to support greening the LGV fleet are:
    a. through the Council's Transformation Programme, a 2-year post of Climate Change Coordinator (Transport) has been approved and is being recruited to bring in a level of expertise, and a programme management approach including lobbying, to take the changes to fleet forward. The post holder will sit within the Climate Change and Energy Team to ensure decarbonising the fleet sits within the wider Council climate change strategy;
    b. funding from Transport Scotland is provided to assist in installing infrastructure for publicly accessible charging and dedicated fleet charging. This amounted to £75,000 for fleet infrastructure in 2020. Implementing this will be an early priority for the post above;
    c. learning from Aberdeen City Council as a European leader in hydrogen ambition and accepting their offer of supporting the retrofit of hydrogen fuel tanks to Highland Council vehicles, depending on national funding being made available;
    d. building and developing partnerships with commercial operators and fuel providers to ensure the ULEV option is a viable one moving forward;
    e. taking a joint approach to procurement with partner organisations in terms of vehicle demand to help the supply chain with manufacturers and fuel providers and through our shared procurement service with Aberdeen City and Aberdeenshire Councils; and

f. work is underway to develop a hydrogen strategy for the Council and the links are being made with the feasibility into an Energy from Waste plant including the potential to convert energy generated to hydrogen for Council and other fleet use as part of the development of a hydrogen strategy for the region.

3. Implications

3.1 Resource

The financial cost of decarbonising the LGV fleet is significant. For example, the projected cost of a 26t Refuse Collection Vehicle (RCV) is £398k for an electric vehicle and £621k for a Hydrogen vehicle. The current cost of a standard Diesel Euro 6 engine RCV is £160k. Looking at the RCV fleet alone of 95 vehicles over a period of 7 years this could amount to a cost currently of £58.9 million for hydrogen vehicles, compared to the current costings of £15.2 million for the diesel equivalent.

3.2 At this time, it is assumed that most LGVs will need to be fuelled by hydrogen if decarbonisation targets are to be achieved. Battery operated LGVs have many challenges to overcome, particularly the weight and size of the batteries affecting payload and the range.

3.3 The introduction and maintenance of charging units or hydrogen refuelling stations to support ULEV would create a substantial additional budget pressure. At present, hydrogen is not commercially available in Highland.

3.4 There will be additional cost to train mechanics to work with new technology in the vehicles, and there will be a requirement to purchase new tools. Site work will be necessary to ensure safe storage and use of hydrogen and upgrading of the electrical network will be necessary to support electric charging facilities. Scottish Government funding will be available to meet some of these costs, and this will be quantified so that we can develop a programme of workforce development.

3.5 A pressure on the market to supply ULEV will impact on pricing and availability as organisations move to replace their fleet to meet internal and national targets.

3.6 Driver training will have to be delivered to ensure drivers are competent and confident when driving ULEV. We expect this will be delivered using in-house trainers.

3.7 Legal

Failing to achieve the Scottish Government's target is more of a reputational risk than a legal risk. The Council does have a statutory duty to monitor and report on its contribution to national climate change targets under the Public Bodies Climate Change Duties (PBCCD). Each year, data is collected in respect of emissions and costs arising from the Council's use of fleet. Modern fuel-efficient vehicles and plant produce less harmful emissions helping to improve air quality across Highland. Relevant fleet and projects undertaken are reported under PBCCD.

3.8 Community (Equality, Poverty and Rural)

More environmentally friendly fleet will result in better air quality for our communities.

3.9 Climate Change / Carbon Clever

Extending our use and increasing the numbers of ULEVs within our fleet will assist the Council to meet its climate change priorities.

3.10 Risk
There is a reputational risk of not meeting the Scottish Government and Highland Council objectives in relation to its Climate and Ecological emergency.

3.11 Gaelic
There are no Gaelic implications arising from this report.

4. Introduction

4.1 The approach to decarbonising the fleet sets out the steps required to contribute towards the regional and national carbon reduction targets and ambitions. A phased approach is being taken with phase 1 focusing on cars and light commercial fleet and a paper was reported to and agreed at the Communities and Place Committee in November 2020. Phase 2 is to cover large goods vehicles (LGV).

4.2 In May 2019, The Highland Council declared a climate and ecological emergency, recognising the increasing threat as a result of the changing climate. In so doing, Members recommitted to achieving a carbon neutral Highland by 2025 and have established a Climate Change Working Group to oversee and expedite the shift to a net zero future.

4.3 The term "ULEV" generally refers to electric and hydrogen fuelled vehicles which produce zero tailpipe emissions.

4.4 It should be recognised that transitioning our LGV fleet from diesel to ULEV is not straightforward. The cost of ULEV vehicles is considerably higher than internal combustion engine equivalents, and until hydrogen vehicles are available in more commercial quantities the cost will remain high, likewise the production and distribution of hydrogen. Industry experts predict that it will be after 2025, and closer to 2030, before manufacturers are producing vehicles in any reasonable quantity.

4.5 A further complication is that manufacturers are focusing on left hand drive vehicles for the European market.

4.6 This burden is not just for the local authority to rectify and it is recognised that we must build and develop partnerships with commercial operators and fuel providers to ensure the ULEV option is a viable one moving forward if we are to meet targets set by Highland Council and government.

4.7 A joint approach to procurement with partner organisations in terms of vehicle demand may help the supply chain in relations to manufacturers and fuel providers. The Transport and Logistics team are working with Aberdeen City Council and Aberdeenshire Council, via the shared procurement service. Aberdeen City Council is a European leader in terms of their hydrogen ambition and is sharing their learning and offers of assistance to other Councils.

5 Targets

5.1 The UK Government has set a target to be carbon neutral by 2050.
The Scottish Government has committed to ending Scotland's contribution to climate change no later than 2045, and in support of this ambition, seeks to:

- phase out the sale of new petrol and diesel cars and vans by 2032;

- phase out the need for all new petrol and diesel vehicles in Scotland's public sector fleet by 2030 (i.e. heavy goods vehicles); and
- phase out the need for all petrol and diesel cars and light commercial vehicles from the public sector fleet by 2025.

5.2 It should be noted that decarbonising the fleet is one workstream within the Council's wider ambition to decarbonise its operations. It is anticipated that a Net Zero Action Plan will be developed over the course of 2021.

5.3 Members will be aware of report Highland's Hydrogen Economy and Update on Opportunity Cromarty Firth's Greenport Bid presented 25 March 2021. Section 6 of this paper relates to Opportunity at Cromarty Firth. The link to this paper can be found HERE.

6 Actions Underway to Meet Targets

6.1 The Highland Council has a diverse fleet of LGVs, from refuse collection vehicles, winter maintenance vehicles, road sweepers, gully suckers and specialist surface dressing vehicles.

6.2 Along with changes to the cars and light commercial fleet, changes to the LGV fleet will provide the Council with a clear opportunity to directly influence the improvement in environmental air quality and a reduction in carbon emissions through reduced travel and the adoption of low carbon and ULEV across the region.

6.3 As reported to the November 2020 Committee, the Council has a statutory duty to monitor and report on its contribution to national climate change targets under the Public Bodies Climate Change Duties (PBCCD). Each year, data is collected in respect of emissions and costs arising from the Council's use of petrol, diesel and gas oil to power its fleet, as well as qualitative and quantitative data in relation to projects and initiatives which have sought to reduce the climate change impact from the use of the fleet over the course of the previous financial year. Modern fuel-efficient vehicles and plant produce less harmful emissions helping to improve air quality across Highland, and projects undertaken are reported under PBCCD.

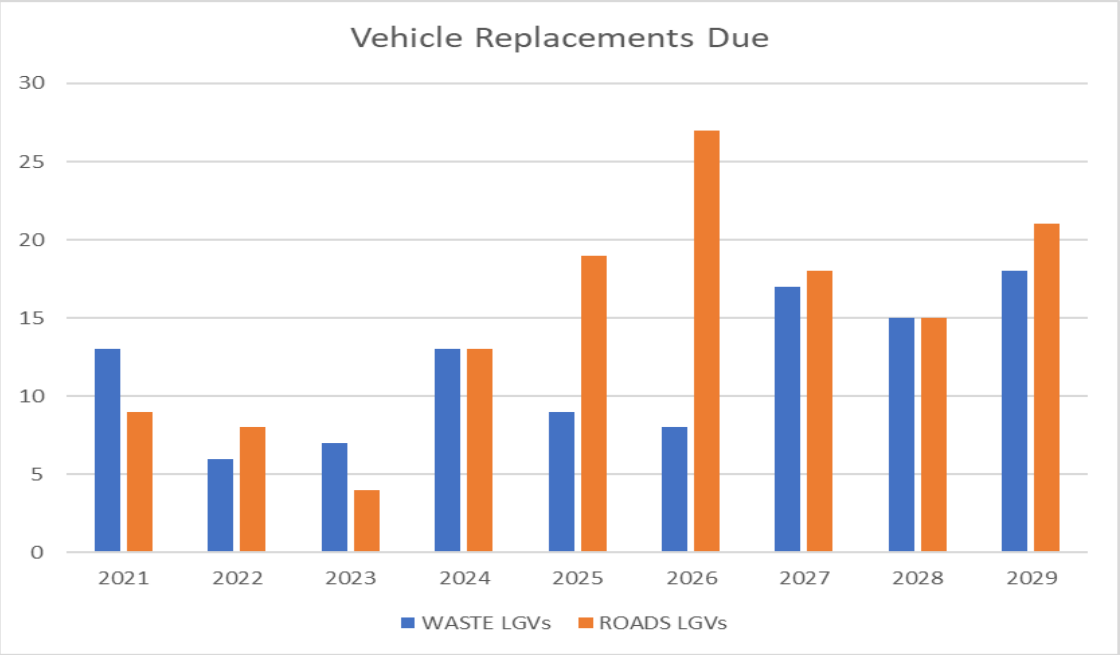
6.4 Over the lifetime of the Council's current carbon management plan (2012/13 – 2019/20), emissions arising from fleet vehicles' use of petrol, diesel and gas oil has decreased from 9,166tCO2e in 2012/13 to an estimated 8,454tCO2e in 2019/20, a reduction of just under 8%. There has been a corresponding reduction in consumption of diesel by the fleet of approximately 315,000 litres, or 10%, over the same timeframe.

6.5 Fleet management already undertakes several initiatives to develop more sustainable forms of fleet operations. These include: the use of telematics and route optimisation software; driver behaviour monitoring and training.

7. Vehicle Replacement Programme

7.1 The tables and graphs below show the LGV replacement programme for both our roads and waste fleet and the estimated cost of replacing the fleet with hydrogen and electric ULEV vehicles. The current programme is based on a 7-year replacement of each vehicle. Unlike the cars and light commercial vehicles which are leased, the LGV fleet is purchased. The replacement programme is aligned to the capital programme which has been reviewed and the fleet element is based as follows:

	2021	2022	2023	2024	2025	2026	2027	2028	2029
No. of waste LGVs to replace	13	6	7	13	9	8	17	15	18
No. of roads LGVs to replace	9	8	4	13	19	27	18	15	21



7.2 Waste vehicles replacement programme

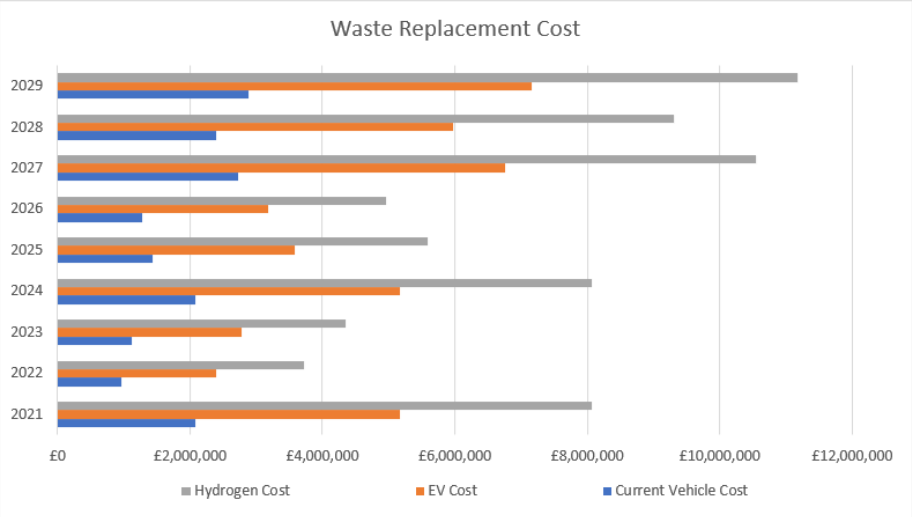
The waste fleet consists of 95 26t LGVs and several other specialist large and small LGVs. The waste operation covers both urban and rural areas and the vehicles are interworked throughout an area. This means we must source vehicles with the correct type of fuel to ensure the vehicle can perform the required tasks taking into account distance travelled and number of bins to be collected.

7.3 The tables and graph below show the comparative cost of procuring vehicles fuelled by diesel (current), EV and hydrogen. Currently EV costs are more than doubled and hydrogen costs are generally trebled. This is based on the procurement costs of the vehicle only and not running costs.

WASTE	2021	2022	2023	2024	2025	2026	2027	2028	2029
Current Vehicle Cost	£2,080,000	£960,000	£1,120,000	£2,080,000	£1,440,000	£1,280,000	£2,720,000	£2,400,000	£2,880,000
EV Cost	£5,174,000	£2,388,000	£2,786,000	£5,174,000	£3,582,000	£3,184,000	£6,766,000	£5,970,000	£7,164,000
Hydrogen Cost	£8,073,000	£3,726,000	£4,347,000	£8,073,000	£5,589,000	£4,968,000	£10,557,000	£9,315,000	£11,178,000

Based on Avg Cost as per below

Current Vehicle Cost	£160,000
EV Cost	£398,000
Hydrogen Cost	£621,000



7.4 <u>Roads Replacement Programme</u>

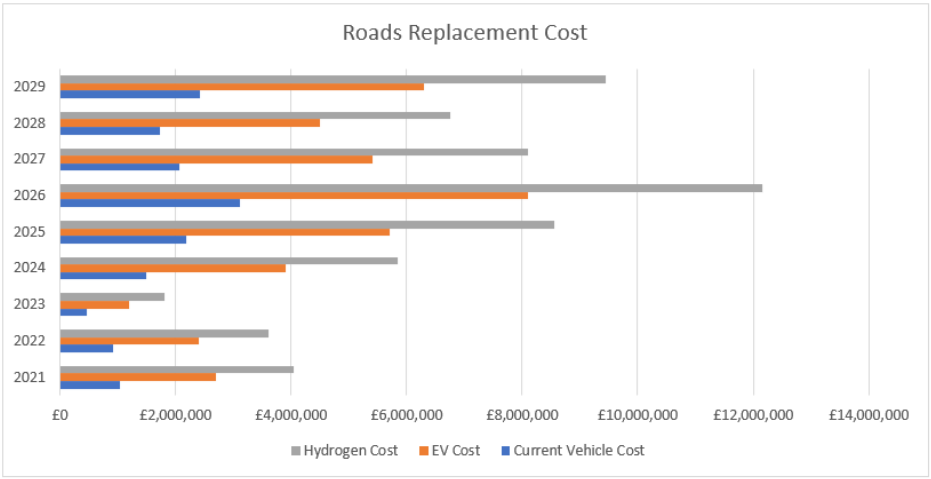
The roads fleet is made up predominantly of multi-use vehicles. These vehicles are designed to be used for roads maintenance throughout the warmer seasons and then by body swaps or roll on gritters are converted to be used for the winter maintenance season. We also have dedicated vehicles such as tar spraying vehicles and dedicated gritters that are used specifically for certain jobs and in the more challenging parts of the highlands throughout winter.

7.5 As with waste vehicles, the tables and charts show that generally EV costs are double and hydrogen costs are treble the cost of diesel vehicles.

ROADS	2021	2022	2023	2024	2025	2026	2027	2028	2029
Current Vehicle Cost	£1,035,000	£920,000	£460,000	£1,495,000	£2,185,000	£3,105,000	£2,070,000	£1,725,000	£2,415,000
EV Cost	£2,700,000	£2,400,000	£1,200,000	£3,900,000	£5,700,000	£8,100,000	£5,400,000	£4,500,000	£6,300,000
Hydrogen Cost	£4,050,000	£3,600,000	£1,800,000	£5,850,000	£8,550,000	£12,150,000	£8,100,000	£6,750,000	£9,450,000

Based on Avg Cost as per below

Current Vehicle Cost	£115,000
EV Cost	£300,000
Hydrogen Cost	£450,000



8 CONSIDERATIONS

8.1 The Highland Council does not undertake standard haulage. Our activities make the vehicles we require very specific in nature and in the roles they must undertake. As such these vehicles have vast amounts of additional and uprated equipment to deal with the

additional draw on electrical and drivetrain energy. For example, gritters use a large amount of energy when snow clearing with blades and powering the systems that operate and control the amount of salt being spread.

8.2 Currently the nature of the roads fleet does not lend itself to use the ULEV available in the market in terms of electricity or hydrogen due to the additional demands on the vehicles with the additional equipment.

8.3 Changing elements of the waste fleet may be more manageable. Some of the RCVs on order for delivery around July 2021 will come with electrical bin hoists. These electrical hoists will reduce noise and engine emissions as the vehicle engines do not need to be held at a minimum RPM to allow the hoist to operate on hydraulics. The vehicles will be deployed in urban areas and will be monitored in the coming years.

8.4 Changing the vehicle type will over time become a necessity. In early 2020, Aberdeen City Council authorised the procurement of 1 full electric RCV and 1 full hydrogen RCV at a combined cost of £864k to allow them to conduct a 2-year evaluation of the alternative fuels. These are due to be delivered financial year 21/22.

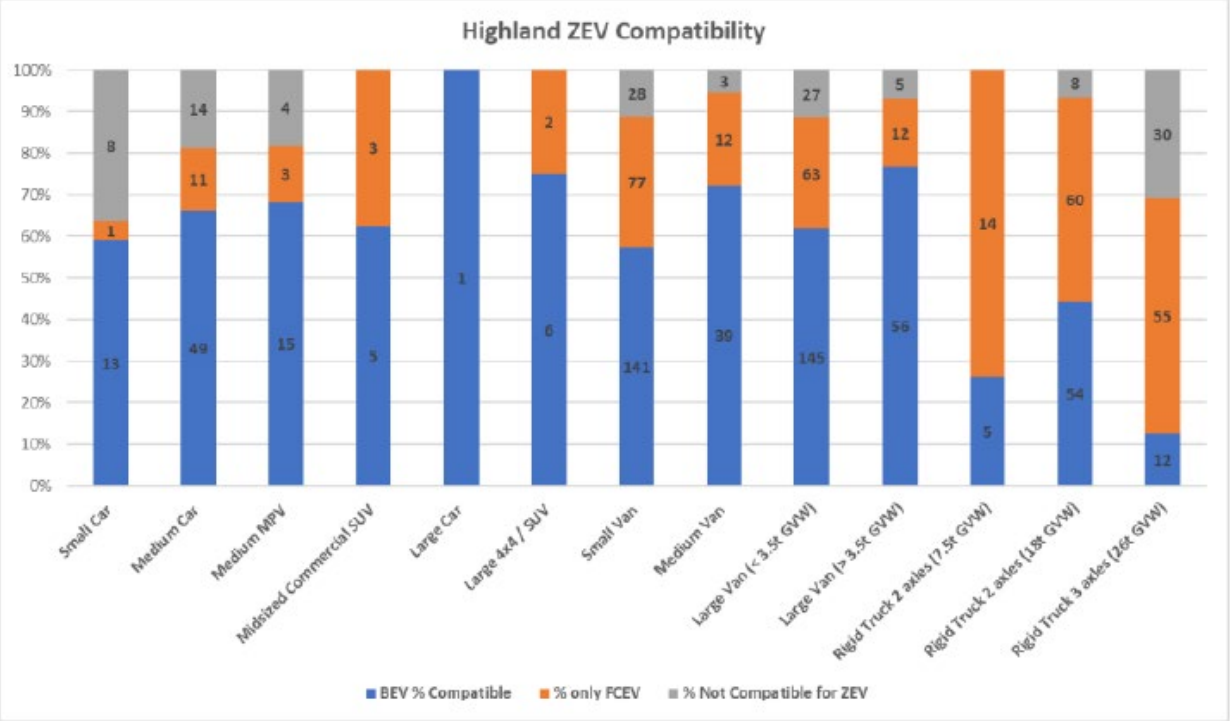
8.5 A quicker route to decarbonising some vehicles is by converting them to duel fuel. Vehicle conversions are available to convert diesel euro VI engines to operate in conjunction with hydrogen. These conversions add hydrogen tanks and systems to the existing vehicle to allow it to run on a hybrid mixture of Hydrogen and diesel. This conversion can cost between £45k - 50k.

8.6 The provision of a reliable hydrogen fuel supply is required along with suitable workshop facilities and for Highland these are not in place yet.

8.7 Aberdeen City Council is introducing some duel fuelled vehicles and Glasgow City is soon to follow in the lead up to COP26.

8.8 The Council was invited to join other Scottish Councils and public bodies in a fact-finding piece of work carried out by an external consultant, to predict the potential fuel types Councils could use based on their current vehicle type, size and mileage. The graph below is an extract from the report into the possible vehicle types for Highland. It is important to state that the results do not reflect market availability of vehicles, or availability of the different fuel types, just what the optimum vehicle type could be.

8.9 The graph shows in blue vehicles suitable for electrification, in orange vehicles suitable for hydrogen and in grey vehicles not suitable for non-zero emission vehicles due to the distances and rurality the Council operates across and potential access to fuelling stations.



Ref Cenex North East Scotland Fleet Review 2021

9. Alternative Fuel Types And Provision

9.1 The alternative fuel types operators are focusing on are electricity and hydrogen.

9.2 Electricity

9.2.1 One of the potential alternative fuels is electricity, currently used for the light commercial fleet of cars and some small vans. The Council has received funding from Transport Scotland to assist in installing infrastructure for publicly accessible charging and dedicated fleet charging. These consist of charging points ranging from overnight trickle charging points (7kW) to fast/rapid charging points (22 – 50kW). In 2020 this amounted to £75k for fleet infrastructure.

9.2.2 To help put this into context a 7kW charge can be gained from plugging the vehicle into a 3 pin 13amp home socket.

9.2.3 An analysis of the electrical infrastructure and requirements at each location will be necessary. This will be a key and early focus for the Decarbonisation Officer.

9.2.4 The infrastructure required for LGV charging is significant. Depot high voltage cabling will require upgrading and additional site electrical transformers will be required to cope with the additional draw from the grid.

9.2.5 There will be costs involved in staff training:

- safe recharging of LGV
- workshop mechanics will require training in working on high voltage vehicles and will require additional tools and equipment

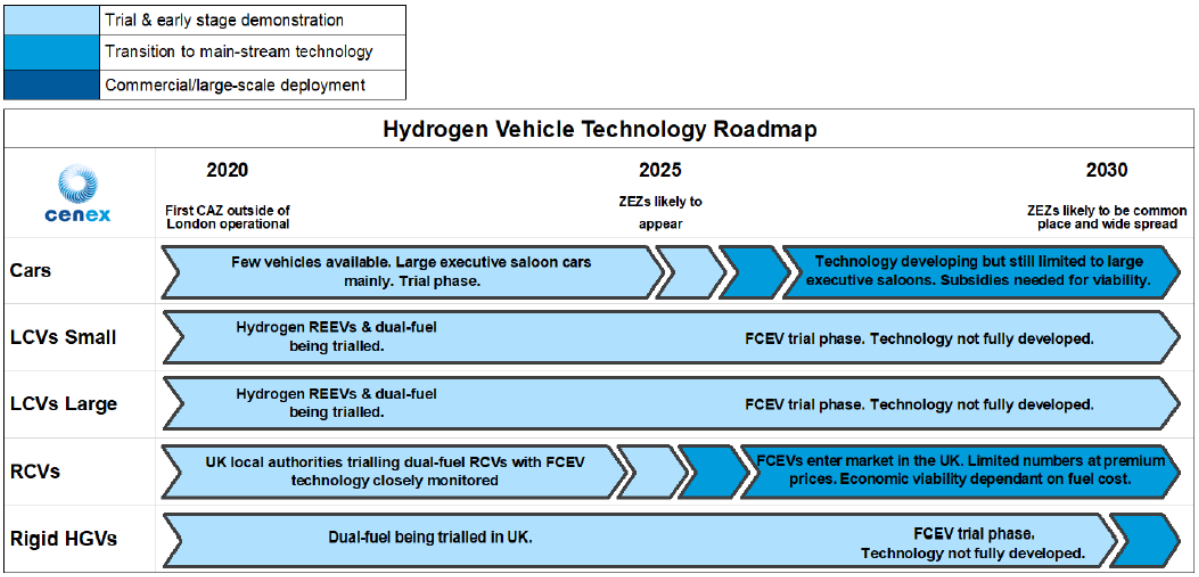
9.2.6 In terms of an alternative to carbon fuels, electricity is widely available at all our sites, but usage will be limited, potentially, by grid capacity at some locations, the cost of vehicles,

the limitation of vehicles in service due to battery weight and power usage, and range between charges.

9.3 Hydrogen

9.3.1 The availability of hydrogen vehicles and fuel is much less mature when compared to electric fuelled vehicles.

9.3.2 The information below is an estimated timeline for hydrogen vehicle technology produced by CENEX from discussions with vehicle manufacturers and hydrogen infrastructure specialists



9.3.2 At present, hydrogen fuelled vehicles pose 2 challenges:

- Hydrogen vehicles are not readily available and as indicated in the diagram above it is unlikely the market will be ready to fulfil demand much before 2030. The launch prices will be high. Hydrogen large good vehicles are available on a trial basis, and generally as a duel fuel vehicle combined with diesel or with range extended batteries.
- There is no hydrogen fuel available in Highland, although much works is being done by various organisations to produce, transfer and supply hydrogen.

9.3.3 Work is underway to develop a hydrogen strategy for the Council, which will set out the Council's vision to support the emerging hydrogen economy within the region whilst clarifying the role the Council will play in supporting this energy transition. This will include the work underway on the feasibility of an Energy from Waste (EfW) project. There are also emerging proposals for a private sector led hydrogen hub project as part of the aspirations for land-based economic development opportunities from off-shore wind projects. In addition, officers are currently in discussion with Scotland's Hydrogen Accelerator in respect of a potential hydrogen demonstrator project within Highland.

9.3.4 Furthermore, Council officers are in regular liaison with colleagues at Opportunity Cromarty Firth (OCF) regarding the proposed hydrogen hub, which could play a significant role in production of green hydrogen from offshore wind, if OCF are successful in securing freeport status.

9.3.5 Council officers are working closely on several approaches to ensure we can take full advantage of experience of other Authorities and technical knowledge from experts in the hydrogen field.

9.3.6 Members will be aware of the work continuing at Aberdeen City Council and the progress the Authority has made with implementing hydrogen. We are liaising closely with Aberdeen to tap into this knowledge via working groups and have developed good working relationships with officers.

9.3.7 Aberdeen City Council aims to reduce its carbon emissions by around 30% by pursuing a 'Hydrogen injection into diesel combustion engine'. To support the practicalities of this it will need to set up supporting infrastructure - workshops to carry out the hydrogen retrofit, deal with ongoing maintenance, training of staff and fuelling stations. It has submitted a bid to Scottish Government for funding.

9.3.8 If funding is secured, they have offered funding to retrofit Highland vehicles at the Aberdeen workshop. This collaborative approach will help Highland Council move forward whilst considering its own longer-term requirements in relation to its fleet and fuel strategy, and in practical terms in relation to workshop requirements, staff training, fuel supply and distribution.

9.3.9 Subject to funding and Aberdeen City Council have their own infrastructure in place, it is anticipated that the retrofit of the selected vehicles would be undertaken in Q2/Q3 2022/23.

9.3.10 The maintenance of these vehicles will need to be considered. Aberdeen City Council have offered to maintain them for us in the short team, but this is not a practical solution. Vehicles would be required to be taken out of service every 8 weeks and driven through to Aberdeen for their routine inspection, meaning vehicle and driver down time of 2 or 3 days each trip. Breakdowns and other repairs would also be problematic.

9.3.11 The Transport and Logistics Manager is at the early stages of scoping out:

- workshop requirements - building and workshop equipment
- staff training
- fuel supply requirements – storage and provision to depots

9.3.12 Work is ongoing as part of the wider Council strategy to identify potential locations for hydrogen refuelling stations. It is anticipated that for this to be viable in the short-to-medium term, it will require buy-in from partners including bus and haulage operators.

9.3.13 Hydrogen will undoubtably become the fuel LGVs will use going forward and the Fleet team are working with professional bodies and other Councils to keep pace with developments and opportunities.

9.3.14 The Climate Change Coordinator (Transport) post will be instrumental in pulling all these stands of work together, including support for Members to lobby on this matter.

10. **Alternative Fuel HVO**

10.1 HVO (Hydro-treated Vegetable Oil) is a synthetic diesel made from waste products, such as frying fat, animal fats or wood pulp. HVO can be mixed in all proportions with normal diesel oil.

10.2 HVO can produce an estimated 90% reduction in CO2 emissions when used in the new Euro-6 engines. The cetane number (indicator of ignitibility) for HVO is between 70–90, which is significantly higher compared to 50–60 for fossil diesel. It provides extra power to the engine and more efficient and cleaner combustion that reduces soot in engines and exhaust systems.

10.3 Unfortunately, HVO is not available at the commercial pump and would require large storage facilities should the authority wish to pursue this option adding another additional budgetary pressure

Designation: Executive Chief Officer Communities and Place

Date: 23.4.21

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