

## ABERDEEN CITY COUNCIL

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<b>COMMITTEE</b>	City Growth and Resources
<b>DATE</b>	25th April 2019
<b>EXEMPT</b>	No
<b>CONFIDENTIAL</b>	No
<b>REPORT TITLE</b>	Aberdeen City Region Hydrogen Strategy 2015 – 2025 Update
<b>REPORT NUMBER</b>	PLA/19/001
<b>CHIEF OFFICER</b>	Richard Sweetnam
<b>REPORT AUTHOR</b>	Andrew Win
<b>TERMS OF REFERENCE</b>	1.2.6 and 1.2.8

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### 1. PURPOSE OF REPORT

- 1.1 To update Members on the delivery of the Aberdeen City Region Hydrogen Strategy 2015-2025 and to recommend a series of actions to ensure that the Council's investment in hydrogen is capitalised on in order to secure future economic benefits for the City.

### 2. RECOMMENDATION(S)

That the committee:

- 2.1 Continue to support the delivery of the approved hydrogen projects in line with the Action Plan and note the 2019 delivery plan with associated resourcing requirements;
- 2.2 Instruct the relevant Chief Officers to assign two retrofitted diesel / hydrogen Transit vans to North East Scotland College (NESCOL) as learning vehicles for the development of a NESCOL hydrogen technical training course;
- 2.3 Delegate authority to Head of Commercial and Procurement Services to enter into contract to purchase 5 additional fuel cell buses from the UK joint Hydrogen Fuel Cell Bus contract framework at no additional cost to the council; and
- 2.4 Instruct the relevant Chief Officers to implement the actions identified in the Council policies and plans review which could incorporate the use of hydrogen technologies in delivering our Local Outcome Improvement Plan objectives.

### 3. MAIN ISSUES

#### Hydrogen Strategy and Investment in 2018

- 3.1 2018 saw the hydrogen sector in Aberdeen continue to grow. Aberdeen's demonstration projects and infrastructure development have

led to many key milestones and achievements being delivered in 2018 in line with the City’s Hydrogen Strategy. Impressively, the previous year’s projects have now established a sound hydrogen sector in Aberdeen which is attracting investors to the city. Notably H2Aberdeen and Invest Aberdeen worked with the Department of International Trade promoting the hydrogen sector in Aberdeen as one of eight energy investment opportunities within the UK on a global platform: <https://invest.great.gov.uk/industries/capital-investment/>.

- 3.2 In line with the established hydrogen programme governance, leading on from the successful establishment of a working delivery group, an external strategy group was rallied to include key public and private sector organisations notably Scottish Enterprise, the Scottish Government, Transport Scotland and Opportunity North East (ONE). This group discusses hydrogen national policy, project development and areas of potential for Aberdeen where funding or collaborative efforts could be achieved.
- 3.3 In terms of the city’s infrastructure developments, 2018 saw a 24% increase in the number of hydrogen vehicles in the city; notably the successful trials of a refuse lorry and road sweeper – thus illustrating the potential benefits hydrogen can bring to fleet services in terms of operational performance and cost savings. Additionally, the Kittybrewster station was upgraded by BOC to allow 700 bar re-fuelling, opening the station to car and van users whilst still meeting the fuelling requirements of the 10 hydrogen buses currently operating.
- 3.4 Benefits from hydrogen vehicles include significant tail to wheel carbon emissions savings compared to their diesel equivalent as well as air quality reductions for lead particulates and nitrogen oxides. The bus project alone in 2017-18 (financial year) saw 192,645 kg hydrogen used, saving 460 tCO<sub>2</sub> well to wheel emissions. Table 1 below shows the headlines for vehicles using the ACHES refuelling station.

**Table 1: Hydrogen Vehicles Refuelling from ACHES Tailpipe Emissions\***

<b>Name of Vehicle</b>	<b>Hydrogen Used (kg)</b>	<b>Total Miles Undertaken</b>	<b>CO2 Savings compared to diesel equivalent (tank to wheel)</b>
Toyota Mirai x 10	2253	109,059	28,877 kg
Hyundai ix35 x 4	821	34,243	10,239 kg
Renault Kangoo x 2	148	6,757	2,035 kg
Ford Transit x 2	190	12,160	2,035 kg
Road Sweeper x 1	275	9,128	2,455 kg
Waste Truck x 2	286	3,408	2,552 kg

\*Feb 2017 until Dec 2018

- 3.5 A critical part of the evolving hydrogen sector is to have trained technicians. 2018 saw the FCH Train project conclude with Aberdeen meeting its objectives of working with NESCOL to create a hydrogen technician course in Europe.
- 3.6 Success has been achieved in marketing and communication with key milestones, such as the hydrogen buses exceeding the 1 million miles mark, being met - making Aberdeen the most successful hydrogen bus demonstration project in its EU project demonstration round. With an ACC Hydrogen Champion appointed through the HyTrEc2 (Hydrogen Transport Economy of the North Sea Region) project, having the weight of a political representative actively and vocally supporting the hydrogen sector in Aberdeen has been invaluable. A series of digital marketing tools have been developed, notably a short film promoting the City's hydrogen sector which the Council collaborated with ITN to produce ([www.youtube.com/watch?v=WD-DBH\\_CDbk](http://www.youtube.com/watch?v=WD-DBH_CDbk)) and a re-fuelling instruction video ([www.youtube.com/watch?v=yi4MIN0MZQs&feature=youtu.be](http://www.youtube.com/watch?v=yi4MIN0MZQs&feature=youtu.be)).
- 3.7 A series of events and visits were held in 2018. The first supply chain event saw 150 attendees from a wide spectrum of hydrogen and other industries looking to diversify in to hydrogen, as well as investment sectors as interest in Aberdeen as a potential investment site grows. This was assisted by the publication of the HyTrEc2 'Hydrogen Supply Chain Map' for how the oil and gas sector can use their current experience to expand into the hydrogen sector thereby developing the Aberdeen economy. Outwith ACC, exciting projects are underway, such as the Scottish Gas Network (SGN) Hydrogen 100 project with Aberdeen one of three potential sites to trial 300 houses with 100% hydrogen in the heating network, and the Pale Blue Dot Acorn project looking at hydrogen Carbon Capture Utilisation and Storage (CCUS).
- 3.8 Given the activities going on in the City the interest from a wide range of demographics, countries and sectors in Aberdeen to see and experience the hydrogen infrastructure in the city has grown in tandem. Notably we have welcomed visitors from Japan, Taiwan, Norway, the USA and New Zealand, along with hosting visits for various professionals including engineers, private sector industry colleagues and academics. Enquiries for investment have also come from India, China and large oil, gas and renewable multinational suppliers currently operating in Aberdeen.

### **Priorities for 2019**

- 3.9 The intention of developing a Hydrogen Strategy with associated infrastructure projects was in order to create a hydrogen economy in Aberdeen; diversifying the oil and gas sector and ensuring that Aberdeen remains a world-class Energy City. The discussion in relation to investment opportunities and supply chain development in 2018 has escalated to such an extent that continued delivery of the Action Plan into 2019 will be pivotal to ensuring that any previous investment the Council has made in hydrogen is finally realised.

- 3.10 A detailed Plan for 2019 has therefore been developed outlining actions for delivery over the next twelve months. This primarily revolves around delivering the European portfolio of projects Aberdeen City Council has signed up to (JIVE, HyTrEc2, see more information in Appendix B) but also includes developing a new concept of a Hydrogen Hub/ Valley in the City to combine energy with transport and heat. In order to support the roll out of a hydrogen technician's course in Aberdeen via NESCOL the City Council also has the opportunity to offer 2 hydrogen-diesel transit vans that have reached their five-year replacement schedule as practical learning tools. Appendix C contains a list of full activities.
- 3.11 All the actions contained within the Plan contain some level of interdependency, however, in order to ensure a hydrogen sector remains embedded in Aberdeen there are several key actions that need to be sustained going forward for which further detail is provided below. Principally these relate to ensuring an adequate supply of hydrogen and ensuring that there is then an end use/ demand of that hydrogen.

#### *Hydrogen Demand*

- 3.12 While there are a number of exciting power and energy projects being proposed for hydrogen within the north east Scotland (Acorn CCS and SGN Hydrogen 100 Project) vehicle deployment remains the key demand for hydrogen at this point in time.
- 3.13 Officers have been working across the various EU projects and with Community Planning Partners to ensure that vehicle deployment is increasing. Another 17 Toyota Mirais are due to be deployed across Aberdeen City and Shire with another 4 Renault Kangos, and road sweeper arriving in 2019.
- 3.14 Early 2020 will see the arrival of the new JIVE project buses and the potential for up to another 10 buses from the Office of Low Emission Vehicles (OLEV) £6.4m Arcola Project, led by BOC Linde and Arcola Energy. The Arcola project requires further development with partners and discussions are ongoing with external funding bodies. A report will be submitted to a future committee on potential deployment to Aberdeen.
- 3.15 With the upgrade of the BOC station to 700 bar Toyota is also looking to sell hydrogen cars to the Aberdeen public; the first location in the UK that this will take place. Officers will therefore continue to seek external funding to expand the hydrogen fleet going forward.
- 3.16 With these commitments in vehicle deployment comes a realisation from private enterprises that hydrogen investment is viable. Ensuring that hydrogen demand is sustained is therefore essential for ensuring there is a business case for offering a supply of hydrogen for Aberdeen going forward.

#### *Hydrogen Supply*

- 3.17 The H2Aberdeen and Invest Aberdeen teams have had several enquiries from large multinational organisations and companies

regarding opportunities for investing in hydrogen production in Aberdeen.

- 3.18 Projections for future hydrogen demand based on existing committed projects (principally hydrogen bus demand) suggest that Aberdeen will require 450 kg/ hydrogen a day by 2023. The current supply from the Aberdeen City Hydrogen Energy Storage (ACHES) facility and the BOC Kittybrewster Hydrogen Refuelling Station will not be sufficient to meet this demand, so an external supply will be required in the near future. If additional transport investment comes forward, then this could reach over 1600 kg/ hydrogen a day by 2023.
- 3.19 Officers are reviewing the options available to the Council to meet this demand requirement. This includes expanding existing facilities but the most feasible option, as established by the JIVE project, is to tender for a supply of green hydrogen, which can be scaled up over time to match demand.
- 3.20 The proposed Hydrogen 100 project, led by SGN, to determine the feasibility to use hydrogen for domestic heating and appliance offers the opportunity to consider one hydrogen production and refuelling facility; providing a long term and commercial supply of hydrogen for the portfolio of hydrogen energy and transport projects across the city. This 'Hydrogen Valley' concept, coupling energy and transport, would be fairly unique and has potential to take hydrogen beyond the current scale able to be delivered by the Council. Officers are therefore exploring this in more detail as part of the 2019 Delivery Plan.

### **Review of Aberdeen City Council Policies**

- 3.21 In order to support the role out of the Hydrogen Strategy as identified in the priorities for 2019, the January 2018 Communities, Housing and Infrastructure Committee approved recommendations for a review of all Aberdeen City Council policies to ensure their alignment with the Council's hydrogen ambitions. Officers have undertaken this review in liaison with the various Clusters that are responsible for any strategy delivery and have summarised this information in the table below. The full review is contained in Appendix D.

**Table 2: Recommended Updates to Aberdeen City Council Policy**

<b>Strategy/ Policy/ Plan</b>	<b>Current Situation</b>	<b>Recommended Action</b>
Local Transport Strategy	References hydrogen	Update will need to reflect current HRS and vehicles
Fleet Replacement Plan	No policy regarding replacement of diesel vehicles with low emission vehicles.	Use of hydrogen vehicles to be detailed in the Fleet Replacement Plan. Fleet to work with Finance/External Funding to identify funding.
Aberdeen Local	No reference to hydrogen	Potential opportunity sites (Bridge of Don, Craibstone) for

Development Plan		hydrogen for energy and transport use are being considered for inclusion within the next ALDP.
Waste Strategy	No reference to hydrogen	Hydrogen production from Energy from Waste to be considered.
Local Housing Strategy	No reference to hydrogen	Potential CHP use of hydrogen for heat and power could be considered in future
Air Quality Action Plan	Reference made to buses	Hydrogen vehicles impact to be considered in annual updates and any review, particularly in relation to any future Low Emission Zone (LEZ).
Local Climate Impacts Profile	No reference to hydrogen	Hydrogen to be considered in 2019 review

#### 4. FINANCIAL IMPLICATIONS

- 4.1 Now that a baseline amount of transport infrastructure is in place and the Council transitions to a facilitative role, there would be a reduction in the amount of capital funding required for bespoke hydrogen solutions after 2020. There are however ongoing revenue requirements to deliver, such as at ACHES, or for the continued running of Council hydrogen vehicles. The maintenance of this initial investment is required to ensure the financial case for investment in hydrogen remains robust.
- 4.2 Where the Hydrogen Strategy actions seek Council funding in order to leverage other funds, this will be sought on a project by project basis following the H2 Governance process and the Council's budget setting processes.
- 4.3 The Council, as partner in the JIVE project, has been granted £1.87m of additional funding from the FCHJU for the deployment of a further five buses and the development of hydrogen refuelling infrastructure. The five additional buses improves the business case for a commercial hydrogen production and supply, therefore allowing the Council to reduce its funding contribution towards infrastructure. This means that the Council can unlock £930,000 of project funds previously identified for hydrogen refuelling infrastructure for the additional buses. There is no additional cost to the Council.
- 4.4 If the ACC hydrogen fleet is to be expanded further additional funding will be required for retrofit/ upgrade. Costs of vehicles and external funding available should be negotiated between Fleet and the External Funding team. Table 3 below shows the current fleet makeup and the number of vehicles that may require replacement if a LEZ banning various engine categories were in place, dependent upon which categories were included.

**Table 3: Fleet Vehicles (March 2018)**

<b>Engine Category</b>	<b>Number of Vehicles</b>
Euro III	6
Euro IV	142
Euro V	211
Euro VI	125
Electric / Hydrogen (do not require replaced)	23

- 4.5 Two of the Council's diesel Ford Transit Vans were retrofitted with a hydrogen fuel cell and tank using EU funding over 5 years ago. It is anticipated that the resale value of the vans (without the equipment) is £1,500 each as the equipment would be removed. Given the Council was involved in the Erasmus FCH Train project with NESCOL it is proposed that these vehicles instead go to the College for use in the technician's course.

## **5. LEGAL IMPLICATIONS**

- 5.1 There are no direct legal implications associated with the policy review or support of the Hydrogen Strategy. Legal advice is sought where required for each individual project.
- 5.2 Aberdeen City Council has contractual obligations that must be delivered in respect to the European projects programme.

## **6. MANAGEMENT OF RISK**

	<b>Risk</b>	<b>Low (L) Medium (M) High (H)</b>	<b>Mitigation</b>
<b>Financial</b>	If reduced support for delivery of the Action Plan the Council's returns (in relation to economic growth, business diversification, energy security, environmental and air quality benefits) will be reduced without capitalising on the wider benefits to the city's economy. It will also be more difficult to secure external funds without a strategic approach and formal commitment.	Medium	Continue to support the Action Plan through appropriate policy updates and staffing resources.

	Brexit also poses a risk for financing and project delivery given that many hydrogen parts and vehicles are sourced from Europe. Travel costs for projects may also increase if time delays to booking travel or visas, etc due to new, yet unknown, regulations.	Risk of project failure - Medium	All project officers will flag risks to their European funding programme. The exact risk won't be known until the outcome of Brexit is known. This may include budget changes or reduction in delivery of project objectives.
<b>Legal</b>	Aberdeen City Council may not fulfil its legally signed obligations; not only risking returning unspent money but returning all money already committed by the project due to undelivered contracts.	Medium	Regularly maintain deliverables log and highlight any potential risk to project delivery
<b>Employee</b>	Staffing for EU projects are required to meet the expected contractual obligations the project from the funding programme.	Medium	Fully resource the EU projects in accordance with signed legal agreements.
<b>Customer</b>	Hydrogen vehicles offer a genuine low carbon vehicle option. If the Hydrogen Strategy and Action Plan is not supported, citizens will have less access to low carbon vehicle options.	Medium	Continue to support the Action Plan through appropriate policy updates and staffing resources.
<b>Environment</b>	If the Hydrogen Strategy and Action Plan is not supported environmental benefits such as reduction of greenhouse gas emissions and air quality benefits will be reduced.	Medium	Continue to support the Action Plan through appropriate policy updates and staffing resources.



<b>Technology</b>	If the Hydrogen Strategy and Action Plan is not supported the potential diversification of oil and gas to hydrogen technologies will be reduced for the region.	Medium	Continue to support the Action Plan through appropriate policy updates and staffing resources.
<b>Reputational</b>	There is a risk that if Aberdeen does not capitalise on its existing hydrogen investment, or indeed pull out of that investment in its entirety, that this would be seen as wasted investment and could prove reputationally damaging.	Medium	Aligned to staffing of EU programmes being appropriately resourced.

## 7. OUTCOMES

<b>Local Outcome Improvement Plan Themes</b>	
	<b>Impact of Report</b>
<b>Prosperous Economy</b>	Hydrogen offers diversification of the economy into a new energy growth sector.
<b>Prosperous People</b>	Increasing uptake of hydrogen vehicles will reduce NOx and Lead particulates, which are known to reduce life expectancy.
<b>Prosperous Place</b>	Increasing uptake of hydrogen vehicles will reduce carbon emissions.

<b>Design Principles of Target Operating Model</b>	
	<b>Impact of Report</b>
<b>Organisational Design</b>	The hydrogen portfolio of projects spans a number of different Clusters. A clear plan for the year ahead will ensure that silo working is reduced, and all areas of the Council are aware of the activities being undertaken alongside any policy implications.
<b>Governance</b>	Reporting to Committee on the update allows members to scrutinise deliverables being implemented by the Hydrogen Strategy and Action Plan and the plan for the year ahead ensures that we can ensure actions are aligned to strategic outcomes.
<b>Technology</b>	Investing in a hydrogen future allows the Council to better prepare for customer's needs in future.
<b>Partnerships and Alliances</b>	The plan for the year ahead includes working more closely with Police, Fire, NHS and 3 <sup>rd</sup> sector to deliver Scottish and local government

	ambitions to reduce carbon emissions and joint working ensuring that the hydrogen technology roll out is inclusive and reflective of the LOIP.
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## 8. IMPACT ASSESSMENTS

Assessment	Outcome
Equality & Human Rights Impact Assessment	Full EHRIA not required.
Data Protection Impact Assessment	Not required.
Duty of Due Regard / Fairer Scotland Duty	Not applicable.

## 9. BACKGROUND PAPERS

Aberdeen Hydrogen Strategy and Action Plan 2015-2025  
[http://archive.northsearegion.eu/files/repository/20150918111637\\_AberdeenHydrogenStrategy\\_March2015.pdf](http://archive.northsearegion.eu/files/repository/20150918111637_AberdeenHydrogenStrategy_March2015.pdf)

Hydrogen Council: Scaling Up Hydrogen  
<http://hydrogencouncil.com/wp-content/uploads/2017/11/Hydrogen-scaling-up-Hydrogen-Council.pdf>

Communities, Housing and Infrastructure Committee, 16<sup>th</sup> January 2018  
Aberdeen City Region Hydrogen Strategy 2015-2025 Update  
<https://committees.aberdeencity.gov.uk/documents/s78068/CHI.17.303%20Aberdeen%20City%20Region%20Hydrogen%20Strategy%202015-2025%20Update.pdf>

## 10. APPENDICES

Appendix A: Hydrogen Strategy Progress: 2018 Activities  
Appendix B: Current Hydrogen Programme  
Appendix C: Hydrogen Strategy: 2019 Delivery Plan  
Appendix D: ACC Policy Review

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## Appendix A: Hydrogen Strategy - Progress against Objectives 2018

Objective	Progress against Tasks	Projects Delivering
1: Promote <b>vehicle deployments</b> by a range of stakeholders in the region	Stakeholders trialling 36 vehicles: ACC City Wardens, NHS, Scottish Environmental Protection Agency, and Co-wheels Car Club. A range of Toyota Mirai business trials with including Rainbow, Aberdeenshire Council, Hydrasun, NORCO. A prototype Nissan e-NV200 electric van with hydrogen range extender was developed, Co-wheels car club began trials with a Renault Kangoo 700 bar van with hydrogen range extender.	HyTrEc2, Aberdeen Hydrogen Bus Project, OLEV, JIVE, Hytime
2: Expand <b>Production and distribution</b> of renewable hydrogen	ACHES station has been investigated for potential renewables on site such as solar panels and discussions are taking place to agree a power purchase agreement to receive electricity from Kincardine Offshore Wind. Green hydrogen options for the JIVE buses are progressing and will be in place by when the buses arrive.	HyTrEc2, JIVE
3: Develop <b>hydrogen refuelling infrastructure</b>	Two refuelling stations available. Kittybrewster has been upgraded to supply 700 bar fuelling for cars and 350 bar fuelling for vans and trucks as well as the buses.	ACHES, H2ME
4: Explore the roll-out of other tried and tested or <b>innovative hydrogen uses</b>	Innovative use of hydrogen as a by-product: The Events Complex Aberdeen (TECA) Energy Centre building will be capable of utilising various technologies to produce power, heat and cooling. Combined heat and power will be generated using one or more of: spark ignition (SI) gas engines coupled to alternators and heat recovery boilers and static hydrogen fuel cells. The hydrogen by-product could then be used for supplying a new HRS in the north of the City.	TECA
5: Encourage the development of the hydrogen economy's <b>supply chain,</b>	FCH Train – developing NESCOL course for hydrogen fuel cell technicians.	FCH Train, HyTrEc2, ACHES

Objective	Progress against Tasks	Projects Delivering
seeking opportunities for the region's existing energy expertise to diversify and benefit from this growing industry	HyTrEc 2 – Mapping of hydrogen supply chain and supply chain event on 9 <sup>th</sup> October 2018.	
6: Promote a greater understanding and acceptance of hydrogen technologies through <b>communication and education activities</b>	<p>Development of ITN video  <a href="https://itnproductions.wistia.com/medias/jm6cdierh3">https://itnproductions.wistia.com/medias/jm6cdierh3</a></p> <p>Development of hydrogen refuelling video.  <a href="https://www.youtube.com/watch?v=yi4MIN0MZQs&amp;feature=youtu.be">https://www.youtube.com/watch?v=yi4MIN0MZQs&amp;feature=youtu.be</a></p> <p>Regular station tours for public, business, international guests and universities.</p>	HyTrEc2
7: Ensure <b>strategy and policy</b> development at all levels of government are supportive of hydrogen technologies	<p>A review of ACC policies has been conducted – please see section 3.9.</p> <p>Scottish Government and UK Government engagement, for example through Scottish Cities Alliance Hydrogen Officer. Scottish Government and UK Government are engaged through project delivery and recent policy announcements within energy and transport recognise hydrogen as a key technology.</p>	HyTrEc2

## Appendix B: Current Hydrogen Funded Projects

Aberdeen City Council's portfolio of hydrogen projects is extensive and has levered in a great deal of external funding into the development of hydrogen infrastructure in the City. The list below indicates the ongoing hydrogen projects and their purpose:

### EU Funded Programme (Euros)

Project Name	Deliverables	Total Cost/ City Council Investment	Project End Date
HyVLoCity	4 H2 buses	€10,200,000 / €1,250,000	31.12.2019
HyTransit	6 H2 buses + dedicated maintenance area	€11,100,000 / €1,250,000	31.01.2019
HyTrEc2 Lead	Project management of Partnership and comms activities	€677,051 / €0	10.10.2021
HyTrEc2 Project Delivery	H2 cars/ vans + road sweeper + green H2 production + H2 supply chain development + H2 training courses	€902,612 / €451,306	10.10.2021
JIVE	Up to 15 H2 buses + refuelling station	€8,595,765/ €1,250,000	31.12.2022
HECTOR	Hydrogen fuel cell waste truck	€1,071,699/ €428,679	31.01.2023

### UK funded Programme (Pounds)

Project Name	Deliverables	Total Cost/ City Council Investment	Project End Date
OLEV Mirais	10 H2 Toyota Mirais	£508,414 / £11,265	31.01.2020
Switched on Fleets	17 Cars + 5 Vans	£258,338 / £2,400	31.03.2022
HyTime	2 H2 Waste Trucks	£89,000/ £0	31.12.2019

## Appendix C: Aberdeen City and Region Hydrogen Strategy: Delivery Plan 2019

The table below highlights the targeted actions for 2019 to ensure Aberdeen remains the leader in Scottish hydrogen project delivery. The first column lists the objective the action is contributing to, the second column the funding programme the action is aligned to (if any) and any resource required to deliver outwith the funding programmes already approved by the Council. Staff time can generally be recharged against the funding programme listed. There are also actions to support an east coast Scotland hydrogen programme, realising that sharing our well-developed knowledge and experiences with these authorities will assist the take up of hydrogen (likely vehicle) deployment along the north/ east of Scotland.

<b>Objective/ Action</b>	<b>Funding Programme/ Resource</b>
<b>Objective 1 – Promote vehicle deployments by a range of stakeholders in the region</b>	
Seek further funding for more hydrogen vehicles	JIVE, HyTrEc2, Transport Scotland, FCH JU, OLEV, Innovate UK/ Staff time
Undertake further vehicle Trials with Partners and other public sector organisations	HyTrEc2, Transport Scotland, OLEV / Staff time
Work with vehicle retrofitters on fuel cell developments as part of Fleet replacement programme, as funding allows	HyTrEc2, Transport Scotland, Innovate UK / Staff time
Work with vehicle manufacturers to establish themselves in Aberdeen City to sell to members of the public/ organisations	HyTrEc2 / Staff time
Explore avenues for continuation of original hydrogen buses	HyTransit, HyVLoCity, Transport Scotland / Staff time

Supporting integration of JIVE and Arcola buses into operator fleets	JIVE/ Staff time
Facilitate Co-wheels/ Aberdeen City hydrogen vehicle trials with other authorities (Orkney, etc) to widen experiences of hydrogen vehicle technology (and therefore promote uptake).	Transport Scotland/ staff time

### **Objective 2 – Expand production and distribution of renewable hydrogen**

Continue to explore options for h2 production at ACHES, TECA and Kittybrewster	JIVE, HyTrEc2/ Staff time
Continue discussions with private operators for renewable production	HyTrEc2/ Staff time
Support Inverness, Stirling, Dundee to develop hydrogen/ low carbon transport projects in their regions including potential distribution of green hydrogen	Staff time

### **Objective 3 – Develop hydrogen refuelling infrastructure**

Explore options for establishing a green hydrogen powered Hydrogen Refuelling Station	JIVE, HyTrEc2/ Staff time
Explore funding avenues and opportunities for creation of distribution points for hydrogen throughout Aberdeen	Staff time
Work with colleagues from the Scottish Government, Transport Scotland and other Partners on developing a hydrogen refuelling network along the east coast of Scotland.	Staff time

### **Objective 4 – Explore the roll out of other tried and tested or innovative hydrogen uses**

TECA – consider by-product for refuelling/ other uses	Staff time
Engage with SGN and support them in their consideration of Aberdeen as one of the sites for the Hydrogen 100 Project	Staff time
Explore options and opportunities for further collaborative projects including working ONE, BEIS and Innovate UK to maximise funding opportunities and partnerships	Staff time
Work with Scottish Enterprise and ONE to consider how to best meet Aberdeen's hydrogen supply/ demand requirements and that learnings from this are	JIVE, HyTrEc2/ Staff time



then shared for potential roll out of hydrogen development across east coast/ Scotland.	
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<b>Objective 5 – Encourage the development of the hydrogen supply chain, seeking opportunities for the region’s existing energy expertise to diversify</b>	
Collaborate with the Department of International Trade, Invest Aberdeen, Opportunity North East, Scottish Enterprise and others to further develop the hydrogen business case and portfolio of transport and energy projects for Aberdeen and North East Scotland	HyTrEc2/ Staff time
Bring in consultancy support/ external funding to outline/ support the investment case for hydrogen opportunities	HyTrEc2/ Staff time
Continue to run a series of supply chain opportunity events	HyTrEc2/ Staff time
Encourage sector coupling of energy and transport projects to develop a ‘Hydrogen Valley’ concept to include the JIVE and Arcola refuelling requirements as well as potential housing (“demand”) and opportunities for “supplying” these projects with hydrogen with Partners and the private sector.	JIVE, ONE, SE, SG, Transport Scotland/ Staff time
Work with colleagues from the Scottish Government and agencies to develop investor ready opportunities in the hydrogen sector designed to accelerate the delivery of hydrogen refuelling infrastructure and vehicles.	Scottish Government, others / Staff time

<b>Objective 6 – Promote a greater understanding and acceptance of hydrogen technologies through communication and education activities</b>	
Assist and promote NESCOL with development of a technicians training course	HyTrEc2/ Staff time
Increase numbers of trained technicians within the City	HyTrEc2/ Staff time
Continue to promote hydrogen via events, website and comms activities to a range of stakeholders and interest groups (including school children)	All H2 Programmes/ Staff time
Offer hydrogen workshops to elected members as requested	Staff time

Increase use of digital marketing tools for dissemination of information	Staff time
Facilitate learning of hydrogen technology through knowledge sharing, materials and hardware (fuel cell demonstration, vehicle trials, etc) with Aberdeen University, NESCOL, RGU and other learning institutions	Staff time

**Objective 7 – Ensure strategy and policy development at all levels of government are supportive of hydrogen technologies.**

Update ESCO, LDP, Air Quality Action Plan, Fleet Replacement Programme, etc	Staff time
Feed into Scottish City Alliance’s Leadership group and input into Scottish Strategy and Action Programme	Staff time
Work with colleagues from the Scottish Government and agencies on hydrogen projects that deliver exemplar Scottish Government policy objectives.	Staff time

## Appendix D: Review of ACC Policies and Hydrogen

Policy/Plan	H2 Included	Scope to add	Service
1.Regional Economic Strategy	Reference to becoming a leader in h2 technology in Scotland as part of a low carbon economy with an objective to maximise the potential of hydrogen to develop a demand for transferable skills in the oil and gas sector. Reference to the H2 Strategy.	Any update to reflect current position.	City Growth
2.Local Outcomes Improvement Plan	Reference to improving deployment of low carbon transport and increasing the number of h2 buses until 2027. With further reference to Aberdeen becoming a leading city in deployment of FCEV's and a hub for hydrogen technologies in Scotland. Reference to vehicle numbers and the H2 Strategy.	Any update to reflect current position.	Strategic Place Planning
3.Smarter Cities Action Plan	Support the H2 Strategy to stimulate innovative h2 projects, advance the take-up of h2 technologies and position Aberdeen as a centre for excellence for hydrogen technology. Delivery of the H2 vision will further Aberdeen's reputation for energy innovation, and support Scotland's ambitions to become a world-leading destination for investment in renewables and low carbon energy.	Any update to reflect current position.	City Growth
4.Local Transport Strategy	Section on Ultra Low Emission Vehicles and the Council facilitating uptake of h2 vehicles to meet air quality, noise, and climate change targets with an objective to facilitate the uptake of	Any update to reflect current position.	Strategic Place Planning

	<p>ultra-low and low emission vehicles as a contribution towards improving air quality in the City. Also references to h2 within the Car Club section and the H2 Strategy.</p>		
5.Fleet Replacement Plan	<p>All fleet h2 vehicles are part of funded trials and the results of the trials are still being collated. In order to expand ACC h2 production and include this in the fleet replacement plan further external funding would have to be sought. New trucks are being developed by various h2 vehicle specialists. There is potential to be involved in funded trials of further vehicles. It is advised that fleet compile a list of trials they would like to take part in and a proposed h2 replacement fleet plan. Advice from External Funding Team would then be required to seek additional funding to help finance these vehicles.</p>	<p>Yes – identify vehicles for replacement with f hydrogen vehicles and the funding required to support this. Identify funding programmes allowing this to occur.</p>	Fleet - Operations
6.Powering Aberdeen (Sustainable Energy Action Plan)	<p>Hydrogen features and includes an aim “to expand the hydrogen network”. It includes a key action to “Continue to seek funding to expand the current hydrogen fleet of 10 On-going Economic Development buses and encourage greater uptake of hydrogen across the city as an alternative fuel.”</p>	<p>Opportunities to identify any further recommendations for expanding h2 to meet other objectives/ actions within Powering Aberdeen.</p>	Strategic Place Planning
7.Aberdeen Local Development Plan	<p>No reference to hydrogen</p>	<p>Renewables for h2 supply, stations, and hydrogen heating programmes</p>	Strategic Place Planning

		could be considered as part of any policy.	
8.Waste Strategy	No reference to hydrogen	Consideration has been given to the potential for producing h2 from the Energy from Waste facility that is being built at East Tullos.	Waste - Operations
9.Local Housing Strategy	No reference to hydrogen	There are no plans to incorporate: Scottish Government guidance is clear on what is to be included in the strategy –no requirement to include h2,	Strategic Place Planning
10. Energy Service Company (ESCO)	Proposed Arms Length External Organisation (ALEO) to manage ACC energy related activity. Going to committee in March 2019. Discussions focussed on whether management of assets, such as ACHES, could be considered.	Decision by Committee not to pursue the SESCO.	Commercial and Procurement
11. Air Quality Management Action plan (2011)	Reference to low emission vehicles within the AQAP and Annual Progress Report produced measuring trends, exceedances etc – includes h2 vehicles. There is a statutory requirement to include an update on the AQAP implementation and measures to improve air quality. Update required but won't be undertaken until LEZ decision is concluded including area and nature.	Annual report refers to hydrogen as a deliverable measure. Low Emission Zone (LEZ) can include hydrogen low emission vehicles if introduced.	Air Quality - Operations
12. City Centre Masterplan	No reference to hydrogen	Unlikely for this to be included	Capital

and Delivery Programme			
13. Sustainable Urban Mobility Plan (2016)	No reference to hydrogen	Possibility for inclusion as part of a Low Emission Zone roll out.	Strategic Place Planning
14. Local Climate Impacts Profile (2014)	No reference to hydrogen	Hydrogen to be considered in review.	City Growth
15. Annual Emissions Reporting to Scottish Government	Bus Project and ACHES included.	Any further update to reflect current position.	Strategic Place Planning