



SMART HyAware | Action Plan
ABERDEEN CITY COUNCIL





General information

Project	SMART-HY-AWARE
Partner organisation	Aberdeen City Council
Other partner organisations involved (if relevant)	
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NUTS2 region	North Eastern Scotland
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1. Introduction

SMART-HY-AWARE is an Interreg Europe programme with a budget of €1,359.626, --, running from the 1st of August 2019 to the 31st of July 2023. Its topic is low-carbon economy. The partners comprise: the Regional Development Agency of Aragon, Lazio Region, the province of Zuid-Holland, municipality of Delphi, Aberdeen City Council and Pannon Business Network Association.

SMART-HY-AWARE aims to promote hydrogen-electric mobility by tackling main infrastructural, technological (range anxiety related) and market uptake barriers related to hydrogen for electro-mobility through the improvement of PI linked to Structural Funds in Europe, addressing the transition to a low carbon economy, as clearly requested by objective 3.1 of the INTERREG EUROPE Programme.

Specific sub-objectives of the project, to reach the main goal, are:

- Exploiting the potential of hydrogen technologies for electro-mobility involving the whole supply chain;
- Improving regional and local strategies which focus on real needs for implementation such as giving impulses for new models of fuel cells integration;
- Increasing efficiency of green propulsion in transport;
- Improving renewable energy grids to cut down electrolysis costs and IT management applications to enable advanced planning of short-to-mid-term power productions and foster use of hydrogen power within distributed networks (Gopalakrishnan Kumar, Serhan Dermici, Chiu-Yue Lin, 2013);
- Increasing the deployment and the accessibility to refuelling infrastructure for both public and private sector in urban and rural areas;
- Supporting the deployment of alternative fuel vehicles in public transport by setting up regional financial support schemes;
- Promoting and assessing new measures favouring public-private partnership (PPP) in the e-mobility sector, by designing suitable PPP business schemes to trigger hydrogen mobility;
- Enhancing the capability of public Authorities in developing effective policies for reducing the carbon footprint of transport activities.



2. Policy context

2.1. Aim of the Action Plan

The Action Plan aims to impact:

- Investment for Growth and Jobs programme
- European Territorial Cooperation programme
- x **Other regional development policy instrument**

Name of the policy instrument addressed: **Aberdeen City Region Hydrogen Strategy and Action Plan**

2.2. Objectives

The policy instrument being addressed is the Aberdeen City Region Hydrogen Strategy and Action Plan 2015-2025. Aberdeen is one of Europe's pioneering regions when it comes to the deployment of hydrogen technology. The City Council aims to stimulate the City's economy through the development and commercialisation of fuel cell vehicles. The Hydrogen Strategy and Action Plan aims to maintain and build on the city's existing progress with hydrogen rollout in the region. The Strategy identifies seven objectives to help achieve this aim:

	Objective	Purpose
1	Vehicle Deployments	A range of local stakeholders deploy hydrogen vehicles
2	Renewable Hydrogen	Hydrogen produced from renewable energy sources is widespread throughout the region
3	Refuelling Infrastructure	An accessible, convenient, and safe refuelling infrastructure network is deployed across the City and beyond
4	Non-Transport Applications	Non-transport applications are tried and tested including stationary power
5	Supply Chain / Market Development	A robust, local hydrogen supply chain is developed which utilises the areas existing energy expertise
6	Communication and Education	A greater understanding and acceptance of hydrogen technologies encourages widespread adoption
7	Policy and Regulation	Hydrogen technologies are embedded in all relevant areas of policy and supported at national level

Table 1: Aberdeen City Region Hydrogen Strategy and Action Plan Objectives and Purpose



Within the lifetime of the Strategy Aberdeen City Council has been working towards the delivery of all of these objectives. Table 2 below highlights progress.

	Objective	Progress towards delivery
1	Vehicle Deployments	<ul style="list-style-type: none"> Aberdeen City Council has trialled hydrogen buses, fuel cell vehicles and dual-fuel vans and waste trucks. 85 vehicles have been deployed to date with 57 currently on the road. Community partners have trialled hydrogen fuel cell vehicles Hydrogen vehicles have been placed on the City's Car Share fleet to allow members of the public and businesses to trial vehicles
2	Renewable Hydrogen	<ul style="list-style-type: none"> Hydrogen at the city's two refuelling stations is produced from 'green tariff' zero carbon electricity (ie produced from renewables) Undertaken various assessments with the market to understand how to scale up to levels of commercial hydrogen. Have tendered for a Joint venture Partner and appointed bp to work with ACC to produce green hydrogen from a solar array.
3	Refuelling Infrastructure	<ul style="list-style-type: none"> The city has 2 operational refuelling stations: Kittybrewster built in 2015, and ACHES built in 2017
4	Non-Transport Applications	<ul style="list-style-type: none"> The city's Exhibition and Conference Centre has 3 fuel cells that provide heating, cooling and power to the Energy Centre and two onsite hotels Completed study looking at the viability of using hydrogen to replace natural gas in the Council's District Heat Network
5	Supply Chain / Market Development	<ul style="list-style-type: none"> Supply chain event held in 2018 with 150 attendees from hydrogen and renewable energy industries Aberdeen City Council continually engages with companies involved in the hydrogen sector Published the North East Hydrogen Fleet Review (Hydrogen Demand) report with public and private sector stakeholders
6	Communication and Education	<ul style="list-style-type: none"> Hydrogen tours at the two refuelling stations Hydrogen School Challenges in various schools (2014, 2015, 2019, 2021) Hydrogen fuel cell vehicles are available for public hire via Co-wheels car club Digital marketing has been used on Twitter and LinkedIn with a number of press releases Publication of Hydrogen Educational booklet



7	Policy and Regulation	<ul style="list-style-type: none"> Hydrogen technology is supported across key economic development, planning and environmental policies at Aberdeen City Council Aberdeen City Council has contributed to the consultation of the UK Hydrogen Strategy and Scottish Policy for Hydrogen and Action Plan
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Table 2: How Aberdeen City Region Hydrogen Strategy Objectives have been achieved

Aberdeen City Council’s proposed performance indicator selected for the policy instrument was **the number of hydrogen fuel cell vehicles used by the Council** increasing to a target of **30**. At the time of the Smart HyAware application, Aberdeen City Council’s fleet comprised 23 hydrogen fuel cell vehicles (including 10 fuel cell buses which have since been rehomed). Since then, this figure has increased, and the fleet now comprises a total of 33 hydrogen fuel cell vehicles (see table 3). The cars and vans are used by Aberdeen City Council staff while the buses are leased to First Bus Aberdeen for public use.

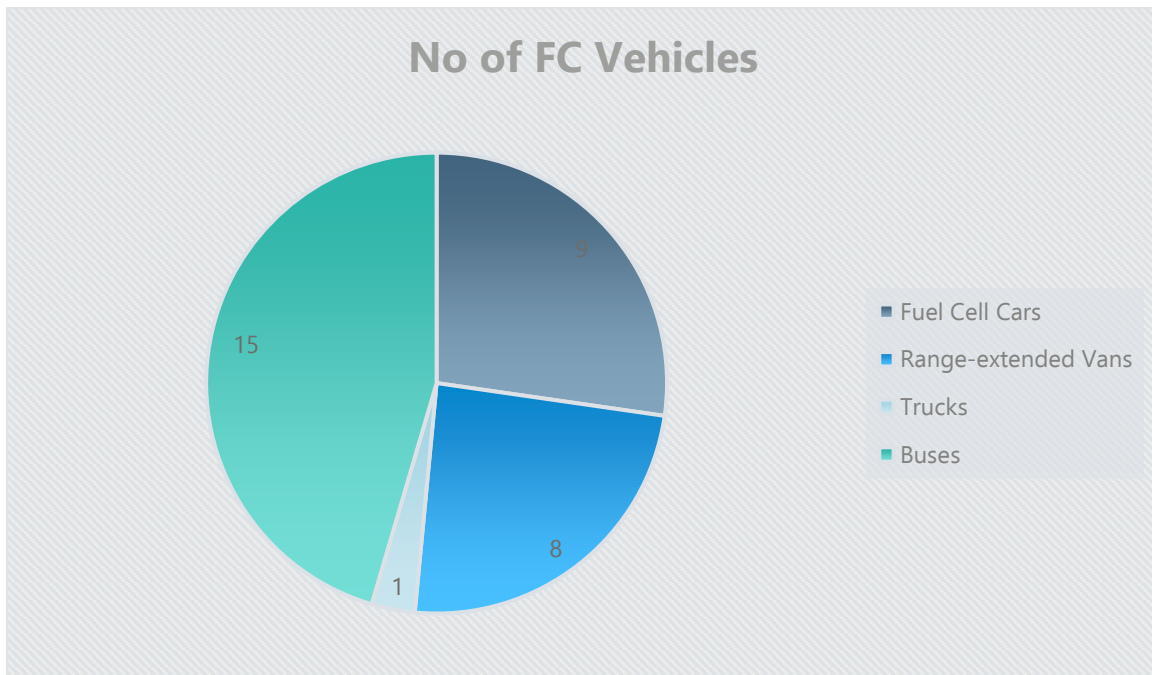


Table 3: Total No of ACC Fleet Hydrogen Fuel Cell Vehicles



2.3. Interregional exchange and learning approach

As part of Smart HyAware, Aberdeen City Council has interacted with the Regional Development Agency of Aragon, Lazio Region, the province of Zuid-Holland, municipality of Delphi and Pannon Business Network Association, and this has fostered exchange of learning and experiences.

During the project, the following learning activities have been carried out:

- Exchange of good practices
- Mutual learning from progress meetings and steering committee meetings
- Participation in Mid-Term Reviews
- Participation in peer reviews
- Participation in knowledge dissemination meetings
- Participation in inter-regional study visits (virtual and physical)
- Organisation of regional stakeholder workshops
- Presentations at Interreg Europe conferences (virtual)

3. Action 1

Name of the action: **Creation of a strategic network of hydrogen refuelling points throughout North East Scotland.**

3.1. The background

Aberdeen City Council's learning process was based on participation in knowledge dissemination meetings with all partners. Discussions were held on governance activities being carried out in the various partner regions. Lessons from the Regional Development Agency of Aragon have been instrumental in the preparation of this Regional Action Plan.

The Regional Development Agency of Aragon shared experience on their development of a 'Hydrogen Corridor for the Pyrenean Region (H2PiyR)'. The H2PiyR project is going to develop a full-scale test bench for a cross border corridor of refuelling stations for hydrogen vehicles that connect the Pyrenean regions of Spain and France with the centre and north of Europe.

This Good Practice was of interest to Aberdeen City Council because it explored the deployment of regional hydrogen refuelling infrastructure to serve demand across borders. As part of Smart HyAware Aberdeen City Council together with Opportunity North East and Scottish Enterprise commissioned Cenex to undertake a study on hydrogen demand in North East Scotland. One of the recommendations from the study was to explore the expansion of regional hydrogen refuelling stations along the strategic road network to serve regional hydrogen demand.



3.1.1 Link with interregional learning and exchange of experiences

- **Peer Review hosted by the Regional Development Agency of Aragon on 09/12/2021 and Good Practice submitted on 23/11/2021**

The Regional Development Agency of Aragon are delivering and expanding a network of hydrogen refuelling points through the Pyrenees region, known as the 'Hydrogen Corridor for the Pyrenees Region'.

The H2PiyR (Hydrogen Corridor for the Pyrenees Region) project's objective is to connect the Pyrenees regions of Spain and France through hydrogen refuelling infrastructure with those in central and northern Europe to establish a strategic opportunity for economic growth and development in the region in the short to medium term. H2PiyR positions Aragon in the European hydrogen corridor network.

H2PiyR is a successfully implemented project that can serve as a model to develop or increase the hydrogen infrastructure and mobility in other regions. The methodology, results and lessons learnt from H2PiyR can be transferred to other regions which are in an initial phase of deployment of HRS infrastructure, or even in a higher penetration phase.

This Good Practice highlights how hydrogen infrastructure deployment can position cities in the main network of trans-European hydrogen transport corridors.

3.2. Action

Aberdeen City Council will create a strategic network of hydrogen refuelling points throughout North East Scotland.

This hydrogen will be used to support regional hydrogen projects and as back-up supply / emergency supply for future hydrogen transport projects in Aberdeen.

In order to deliver this action, Aberdeen City Council will complete the following sub-actions:

1. Assess at least 3 sites across North East Scotland for remote refuelling and technical capability
2. Approach the market for adaptation and upgrade of existing hydrogen assets to enable tube trailer refuelling.
3. Purchase and/ or lease tube trailers.
4. Develop at least 1 remote hydrogen refuelling site across North East Scotland.

3.2.1 Objectives

- Increase the number of remote refuelling sites across North East Scotland by Q2 2023
- Increase the number of hydrogen vehicles across the North East of Scotland by Q2 2023
- Increase the amount of hydrogen dispensed from existing Aberdeen City Council assets by Q4 2022



3.2.2 Target Group

The target group and beneficiaries of this Action would be users of hydrogen fuel cell vehicles: this includes Aberdeen City Council, First Bus Group Aberdeen, Community Partners, Aberdeenshire Council, Highland Council, and other North East Scotland regional customers.

3.2.3 Content

Low carbon hydrogen will be essential for achieving net zero targets. Both the [UK Hydrogen Strategy 2021](#) and the [Scottish Government Hydrogen Policy Statement 2020](#) support green hydrogen production. The Scottish Government Hydrogen Policy Statement recognises the growing large demand for green hydrogen and has a vision for Scotland to become a hydrogen nation that is able to produce reliable, competitive and sustainable renewable hydrogen. The UK Hydrogen Strategy has set a target of 5GW of low carbon hydrogen and the [European Commission Hydrogen Strategy 2020](#) also has an objective to install at least 6GW of renewable hydrogen electrolyzers by 2024.

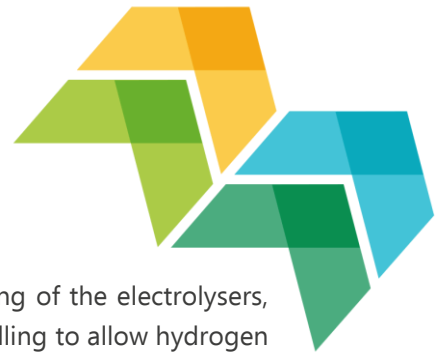
As part of Smart HyAware Aberdeen City Council together with Opportunity North East and Scottish Enterprise commissioned Cenex to undertake a [study](#) on hydrogen demand in North East Scotland. Findings from the joint fleet review on hydrogen demand were: (i) 89% of all vehicles that were reviewed are Zero Emission Vehicle compatible; (ii) Of the 89%, 32% are fuel cell compatible; (iii) the annual hydrogen demand of the 32% vehicles would be 745 tonnes; (iv) vehicles that were hydrogen compatible were 7.5 tonnes or larger (mostly heavy duty); and, (v) there are limited plans for Operation Equipment Manufacturers to consider supplying right hand drive fuel cell vehicles in the UK in the short term. The fleet review report has been shared with Smart HyAware partners, the Scottish Government and Transport Scotland.

Aberdeen currently has two publicly available hydrogen refuelling stations but these only serve Aberdeen City demands – anyone in the wider region requiring hydrogen needs to travel into the City Centre to access hydrogen thereby increasing costs, making vehicle adoption less economical, inconvenient and therefore less likely to occur across the region.

One of the recommendations from the Smart HyAware joint fleet review to support hydrogen transport deployments was to explore the expansion of regional hydrogen refuelling stations along the strategic road network to serve regional hydrogen demand. This is very much the approach that Aragon has adopted for H2PiyR and Aberdeen wishes to replicate for this Regional Action Plan: a strategic network of hydrogen refuelling throughout North East Scotland. To facilitate this network hydrogen could be supplied by the Aberdeen Hydrogen Hub (after 2024), Aberdeen City Hydrogen Energy Storage (ACHES) and/ or The Exhibition Centre Aberdeen (TECA) Energy Centre from 2022 onwards.

Currently ACHES can produce up to 130kg of hydrogen a day and has the potential to be upgraded to improve storage, tube trailer access, safety modifications and training for the operator to allow for facilitated tube trailer refuelling as well as vehicle refuelling. These improvements would enable tube trailer refuelling to allow hydrogen fuel to be distributed to strategic refuelling points around North East Scotland.

Aberdeen City's exhibition and conference centre 'The Event Complex Aberdeen' (TECA) has an onsite Anaerobic Digestion (AD) Plant and Energy Centre and has capability to produce up to 400kg of



hydrogen per day, although none is being produced at present. Commissioning of the electrolyzers, additional storage and site access improvements would enable tube trailer refuelling to allow hydrogen fuel to be distributed to strategic refuelling points around North East Scotland.

Both Highland Council and Aberdeenshire Council have expressed interest in being part of a hydrogen refuelling network across the North East Scotland and studies will shortly take place to assess publicly accessible sites linked by the strategic road network.

The intention of this Regional Action Plan is therefore to replicate Aragon's H2PiyR project by creating a network of hydrogen refuelling points across North East Scotland. This will be achieved by upgrading existing assets and developing new sites which will facilitate remote tube trailer refuelling. Fuel from these sites can be used for existing and future fuel cell hydrogen vehicles in Aberdeen and the North East and can also be sold to hydrogen suppliers.

3.3. Partners and players involved

- Hydrogen Team, Aberdeen City Council – an Officer from the Hydrogen team will facilitate, coordinate and deliver this piece of work.
- Aberdeenshire Council
- Highland Council
- First Bus Group
- Cummins – Responsible for preventative maintenance of ACHES
- Norco – Day-to-day operators of ACHES
- FES – Operators of the Energy Centre at TECA
- Appointed bidder for tube trailer supply and intervention works to hydrogen assets to enable mobile refuelling.

3.4. Timeframe

The following sub-actions will be delivered between July 2022 and June 2023:

1. Assess at least 3 sites across North East Scotland for remote refuelling and technical capability – July 2022
2. Approach the market for adaptation and upgrade of existing hydrogen assets to enable tube trailer refuelling – August 2022
3. Purchase and/ or lease tube trailers – August 2022
4. Develop at least 1 remote hydrogen refuelling sites across North East Scotland – June 2023

3.5. Costs (if relevant)

Total cost: £5,000,000.



3.6. Funding sources (if relevant):

The delivery of the actions within this RAP will be funded by Aberdeen City Council and the Scottish Government's Energy Transition Fund.

3.7. Expected impact

Completion of this Action will:

- result in the creation of a hydrogen refuelling network in North East Scotland thereby replicating Aragon's H2PiyR project and fulfilling one of the recommendations from the Smart HyAware joint fleet review.
- result in the upgrade of Aberdeen City Council assets which will increase the capacity of renewable hydrogen in the city region. It is hoped that hydrogen produced at the refuelling points can be tube trailered across North East Scotland and potentially beyond, to meet immediate and future demand.
- result in the outworking of public-private partnership working to foster hydrogen technology development in North East Scotland.
- help achieve Objective 2 'Renewable Hydrogen' of the Aberdeen City Region Hydrogen Strategy and Action Plan 2015-2025 which is focused on ensuring hydrogen produced from renewable energy sources is widespread throughout the region.
- help achieve Objective 5 'Supply Chain / Market Development' of the Aberdeen City Region Hydrogen Strategy and Action Plan 2015-2025 which is focused on engaging with partners involved in hydrogen technology.