

# Hydrogen in the Energy City

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Association for Public Service Excellence



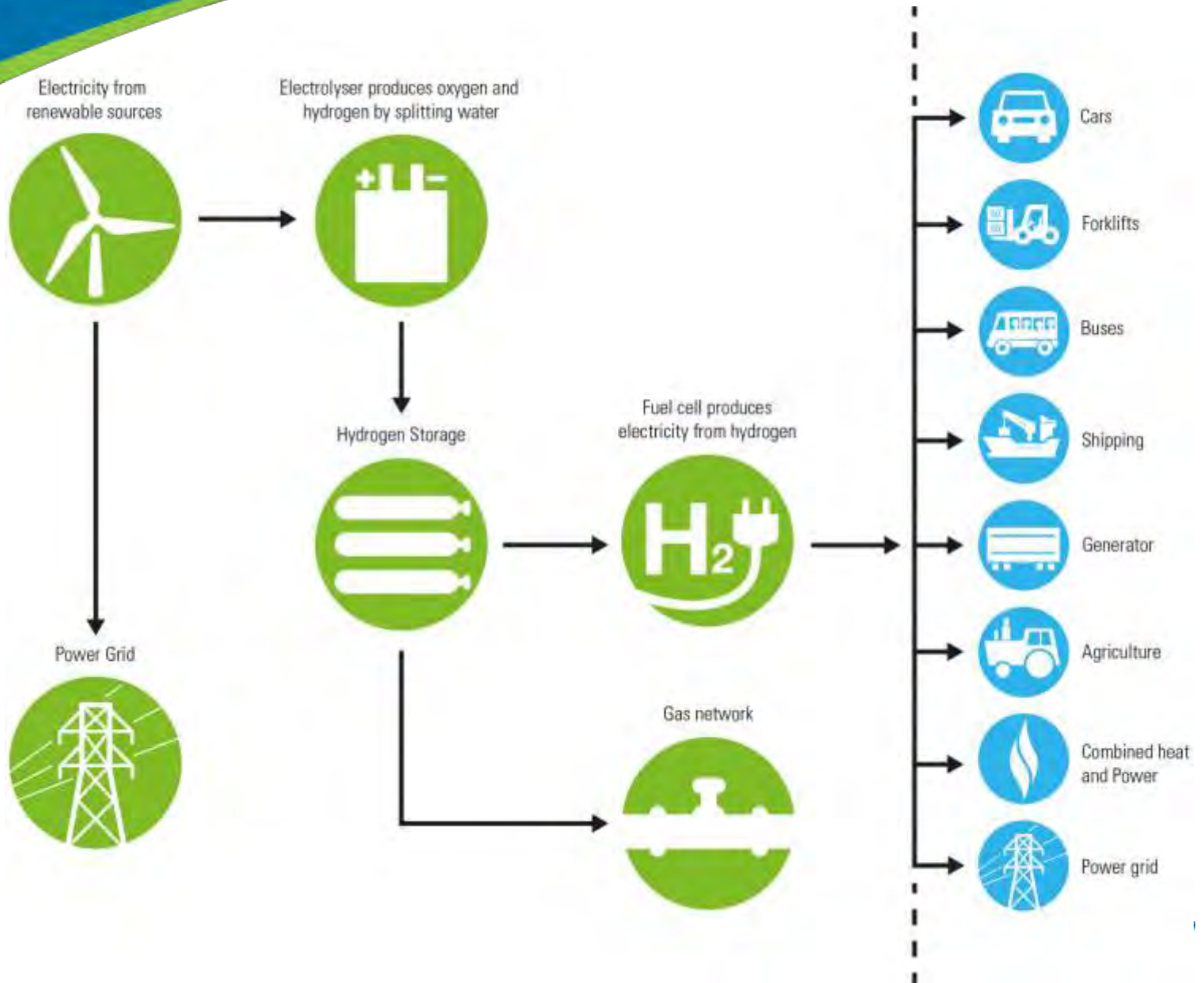
# Aberdeen

- Leading a low carbon economy
- Long term future as energy city



# Why Hydrogen?

air around carbon cell commercial domestic economic economy efficiency  
electricity energy fuel gas heat  
**hydrogen** industry manufacture market natural network  
power produce production quality quantity renewables  
scotland scottish sector security significant simply storage stored  
system technology **transport used vehicles** world



# About the Hydrogen Bus Project

- EU Funded project of £19 million, comprising of 9 project partners
- First project of its kind in Scotland
- Europe's largest fleet of Hydrogen fuel cell buses
- A state-of-the-art refuelling station
- Dedicated hydrogen maintenance facility



# Hydrogen Bus Refuelling Station



# Project Funders

## Fuel Cells and Hydrogen Joint Undertaking

Technology Strategy Board  
Driving Innovation



ABERDEEN  
CITY COUNCIL



The Scottish  
Government



TRANSPORT  
SCOTLAND

The Scottish Government



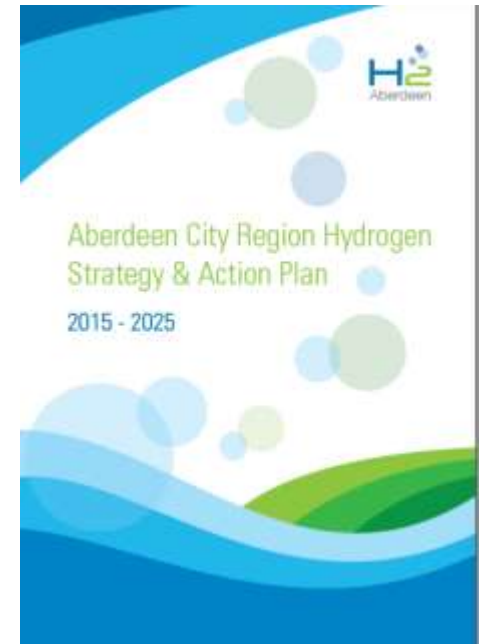
# What next?

- Aberdeen Hydrogen Bus Project
  - - Operations phase
- Second refuelling station
  - capable of refuelling all hydrogen vehicle types (350 & 700bar)
  - accessible to the public
- Work with local partners and car manufacturers to deploy first generation vehicles
- Support the Council fleet
- Ensure a second major FCB deployment from 2018
- Work with other regions to seed a Scottish refuelling network linking to the work of the UK H2 Mobility programme



# Hydrogen Strategy

- Outlines actions required over the next 10 years to cement the city as a leader in the emerging hydrogen and fuel cells sector
- Opportunities to diversify activities
- Deploy first generation vehicles
- Support Aberdeen city council as early adopter for new vehicle types



# FCH-JU Bus Commercialisation Study



**Roland Berger**  
Strategy Consultants

# Deployment Scenario for Scotland



Confidential data enclosed – For  
SCA City internal use only, not for  
external distribution

SCA Hydrogen Strategy:  
Final Report

Scottish Cities Alliance

28/10/13

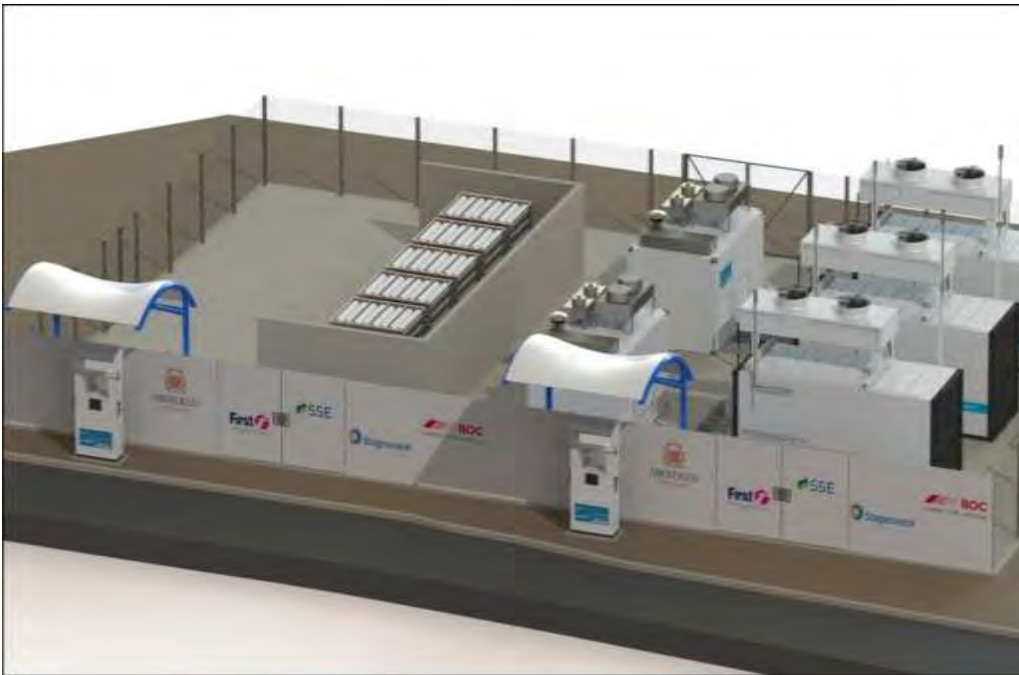
Author  
Element Energy Limited

- Renewable Hydrogen generation
- HRS infrastructure deployment
- Fuel cell bus fleet deployment
- Council fleet FCEV deployment



Credit Norman Adams, Aberdeen City Council

# Hydrogen Bus Refuelling Station



Visualisation of Proposed Development



# Vehicles & Infrastructure

- 2 Diesel vans converted to hydrogen
- 2 Electric vans with fuel cell range extenders
- 2<sup>nd</sup> refuelling station



# Interested regions

## Overview participating locations



## Public

Public contract run by public operator; long concession durations (>15 years)

**Buses bought by public operator**

Deployment as part of normal replacement of buses

Local authorities buy buses and lease them to private operators at diesel lease price

- > Organisation of joint procurement
- > Match financing
- > Bus standardisation

## Public - Private

Public contract run by private operator; mid-term concession duration (8-12 years)

**Buses bought by private operator or leased to them**

FC bus deployment is made part of a new Concession

- 
- > Integration of FC buses in concessions
  - > Joint procurement of private operators

- Alignment of concession grant schedules

## Private

Privatised market run by private operators alone; no concessions as in other types **Buses bought by private operator or leased to them**

Local authorities buy buses and lease them to private operators at diesel lease price

Private operators procure buses and get non-discriminatory subsidy

- 
- > Securing a viable business case for private operators
  - > No direct influence of public side on public transport provision



# Joint Procurement

- Clusters need to **identify their intended deployment schedules** for joint procurement planning and as crucial sign of commitment to the FCH JU Board
- Implications of **local framework conditions need to be analysed** and a **feasible approach for implementing joint procurement** for each cluster needs to be developed
- Clusters need to engage in **discussions with bus OEMs** on what standardisation of buses is required for sensible joint procurement and realising the target price of €650,000
- Clusters need to engage in discussions with local stakeholders, regional and national governments to **get access to required match funding**

## Toyota launches 2015 Fuel Cell Bus

- Commercial uptake of fc cars will pass 1000 units/y by next year, i.e. the target volume for fc buses
- Economies of scale start to materialize.

### Nikkei 15.12.14:

- Toyota originally planned to sell 400 Mirais in Japan by the end of 2015. In the U.S., it seeks to move 3,000 units or more by the end of 2017. In Europe, the plan was to sell 50 to 100 units a year around 2016.
- With strong interest from businesses and public offices, orders exceed the current annual capacity of 700 units (and will be increased to 2000 units from 2016).
- Toyota will (therefore) invest about 20 billion yen (\$165 million) to triple domestic production capacity for the Mirai fuel cell vehicle in light of strong corporate and public-sector demand.
- Fuel cell vehicles are expected to boost the Japanese economy to the tune of 4.4 trillion yen by 2030, according to Deloitte Tohmatsu Consulting.



Toyota 2014 Mirai fuel cell car



Toyota/Hino 2015 fc bus with two Mirai fc systems and hybrid controls. In service since January 9, 2015 in Toyota city.

## LoU Handover Ceremony in Brussels, 12 November 2014



Left to right: First Mayor Olaf Scholz (Hamburg), Deputy Mayor Kit Malthouse (London), Filip van Hool (CEO Van Hool), Dariusz Michalak (Deputy CEO Solaris), Rémi Henkemans (Managing Director VDL Bus & Coach), Gustav Tuschen (Head of Product Engineering Daimler Buses)

- > **Olaf Scholz, First Mayor of Hamburg, clearly indicated commitment** to large scale roll-out of FC buses in Hamburg – This was underlined in an interview published in the Handelsblatt, a major German daily newspaper with business focus
- > **Kit Malthouse, Deputy Mayor of London, underlined the importance of FC buses** and called upon the industry to take the next step, indicating that the "bride" (policy and operators) was ready and awaiting a marriage proposal from the groom (industry), i.e. clearer industry commitment and lower prices
- > **Prof. Mohrdieck, Director Drive Development Fuel Cell System Daimler presented cost projections** indicating that the FC bus purchasing price can be on the level of the price of a hybrid diesel in the long run
- > **All OEMs underlined commitment** to invest in the technology as stated in the LoU

## Riga – 22/23 June 2015



- > The TEN-T Days will gather Ministers of Transport, Members of the European Parliament and key stakeholders from the transport sector in Riga
- > Main topic is the development and financing of the trans-European transport network
- It is a key event on transport policy in the EU with around 1,300 expected participants
  - Therefore the ideal place to put fuel cell buses on the political agenda
- > The presentation of a joint LoU of the coalition at the TEN-T Days would be a strong signal to the FCH JU Board to approve funding programme

