



FUEL CELLS AND HYDROGEN
JOINT UNDERTAKING

JIVE
Joint Initiative for hydrogen
Vehicles across Europe



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Programme Review Days 2018

Brussels, 14-15 November 2018

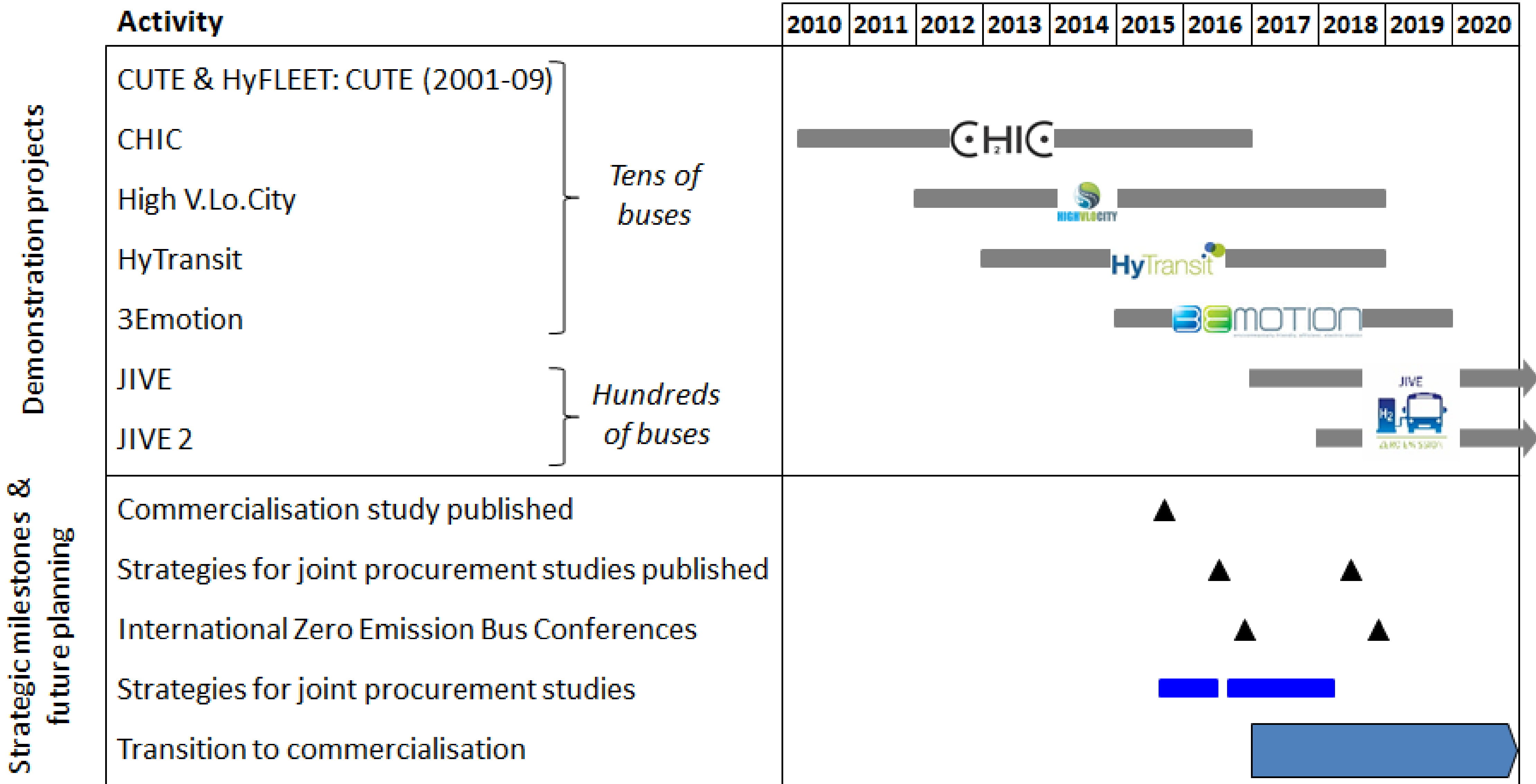
PROJECT OVERVIEW



- **Call year: 2016**
- **Call topic: FCH-01-9-2016: Large scale validation of fuel cell bus fleets**
- **Project dates: 1st January 2017 – 31st December 2022**
- **% stage of implementation 01/11/2018: 30%**
- **Total project budget: 106m €**
- **FCH JU max. contribution: 32m €**
- **Other financial contribution: 74m €**
- **Partners: Aberdeen City Council; Birmingham City Council; Dundee City Council; EE Energy Europe; Element Energy; FONDAZIONE BRUNO KESSLER; ; Herning Kommune; HyCologne; Hydrogen Europe; HySolutions; London Bus Services Limited; PLANET; Rebel Group; Regionalverkehr Köln; Rigas Satiksme; SASA; Thinkstep; Trentino Trasporti ; UNION INTERNATIONALE DES TRANSPORTS PUBLICS; VERKEHRS-VERBUND MAINZ-WIESBADEN GESELLSCHAFT MIT BESCHRANKTER HAFTUNG; WSW mobil GmbH**



PROJECT CONTEXT



PROJECT SUMMARY



Together, JIVE and JIVE 2 will demonstrate nearly 300 FC buses in over 20 different cities across Europe.

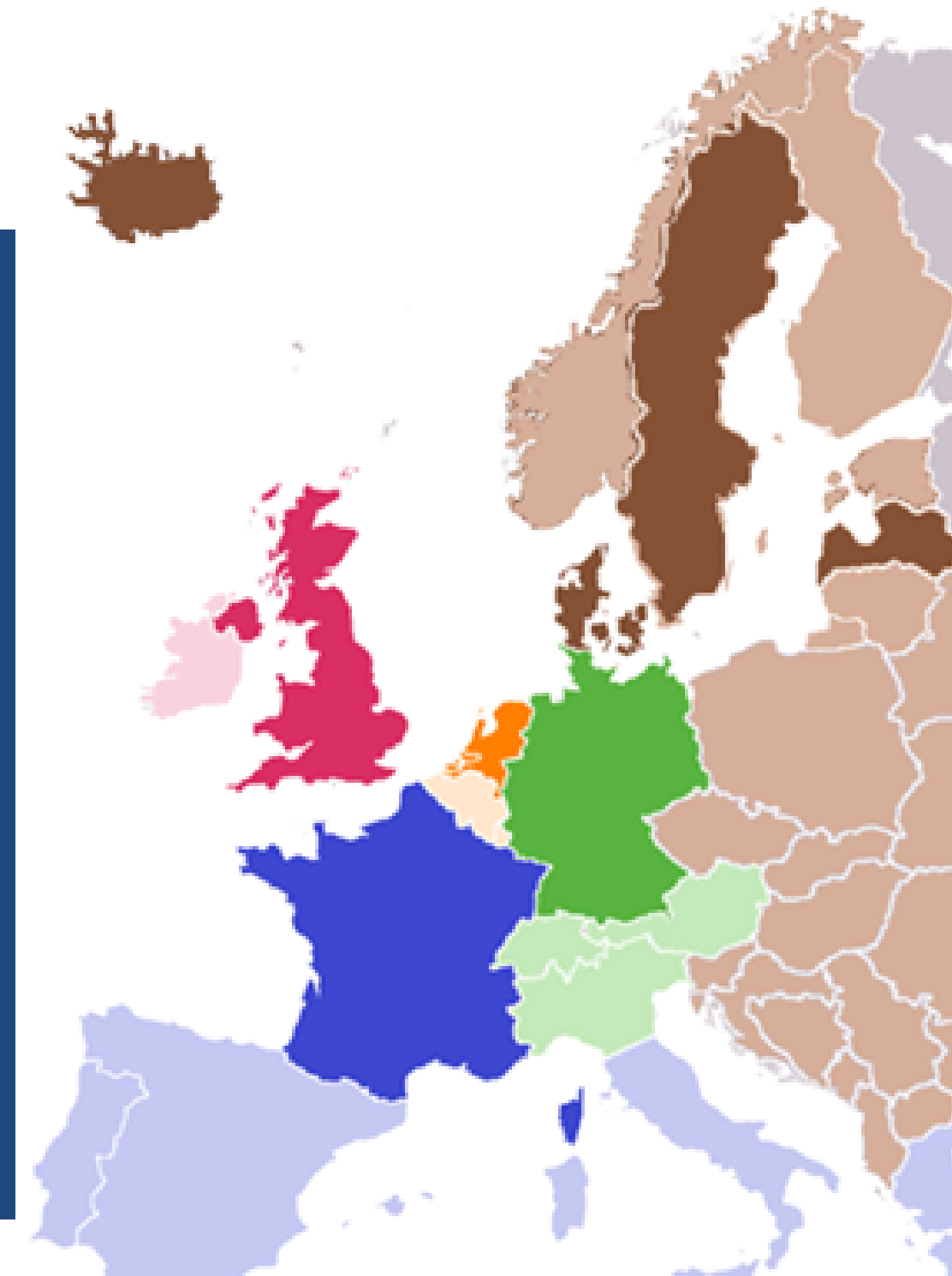
JIVE = 139 buses in nine cities

Joint Initiative for hydrogen Vehicles across Europe

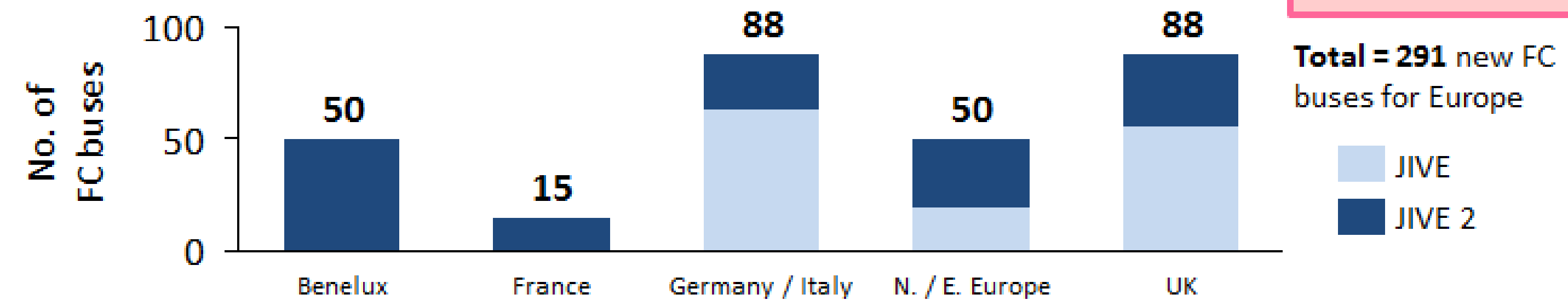


Objectives

- Deploy large fleets of FC buses and associated refuelling infrastructure
- Achieve a maximum price of €625k for a standard fuel cell bus (JIVE 2)
- Validate large scale fleets in operation
- Enable new entrants to trial the technology
- Demonstrate routes to low cost renewable H₂
- Stimulate further large scale uptake

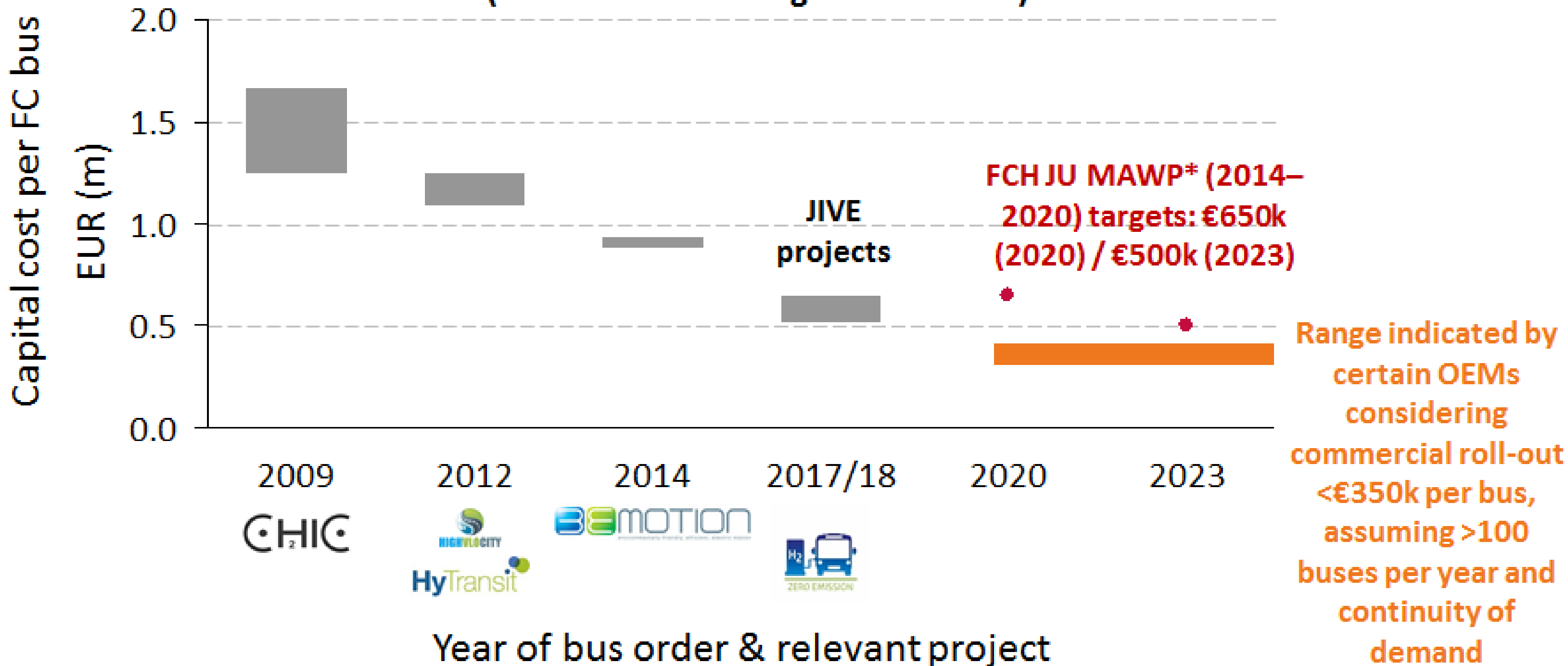


- Benelux Cluster**
(50 FC buses)
- France Cluster**
(15 FC buses)
- Germany / Italy Cluster**
(88 FC buses)
- Northern / Eastern Europe Cluster**
(50 FC buses)
- UK Cluster**
(88 FC buses)

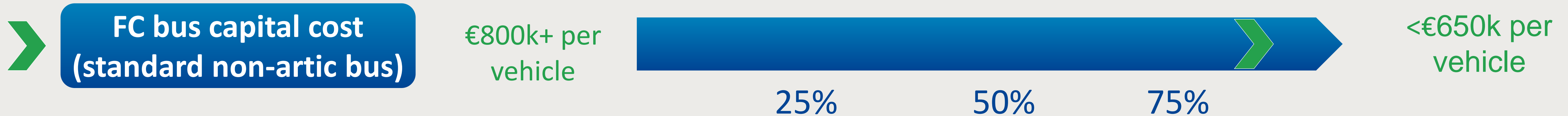


CENTRAL OBJECTIVE: reduce costs using economies of scale

Capital costs of fuel cell buses ordered in different years
(non-articulated single deck buses)



PROJECT PROGRESS/ACTIONS – capex target



- Joint procurement approaches have been largely successful in securing offers for lower cost fuel cell buses.
- However, the path to achieving this target has not been without obstacles (see below)...



PROJECT PROGRESS/ACTIONS – FC bus deployment



 Vehicles deployed
(# buses)

0



25%

50%

75%

139

- As of November 2018, none of the JIVE buses has been deployed.
- A total of 51 (of the 139 (37%)) have been ordered and are being built for delivery in 2019.
- Contracting discussions for the remaining (88) buses are at advanced stages.



PROJECT PROGRESS/ACTIONS – vehicle orders



- Order of 40 Van Hool buses (30 for Cologne, 10 for Wuppertal) confirmed in February 2018
- Europe's largest ever order for FC buses
- Delivery of vehicles planned from spring 2019

Source: www.vanhool.be/en/news/van-hool-bouwt-40-waterstofbussen-voor-keulen-en-wuppertal-duitsland-copy



- The order of 11 FC buses from ebe EUROPA for use in Wiesbaden, Mainz and Frankfurt am Main was recently announced – 12m and 18m vehicles
- The buses will be manufactured by Autosan in Sanok (Poland) and are due to enter service in



Source: <https://fuelcellworks.com/news/wiesbaden-mainz-and-frankfurt-purchase-eleven-hydrogen-fuel-cell-powered-buses-and-a-new-hydrogen-r>

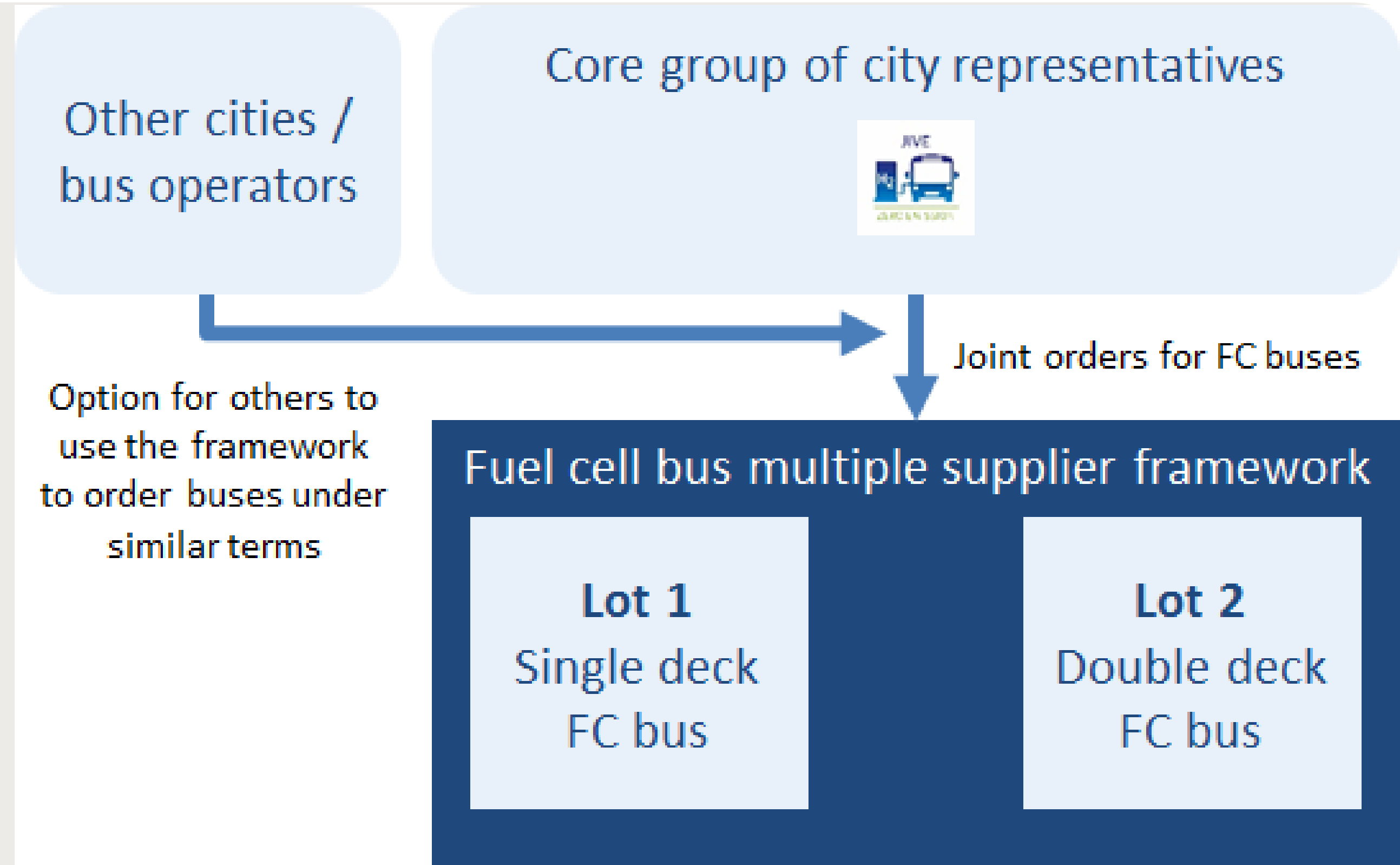
summer 2019

PROJECT PROGRESS/ACTIONS – joint procurement framework



Framework for joint procurement of FC buses (awarded May 2018) – key features:

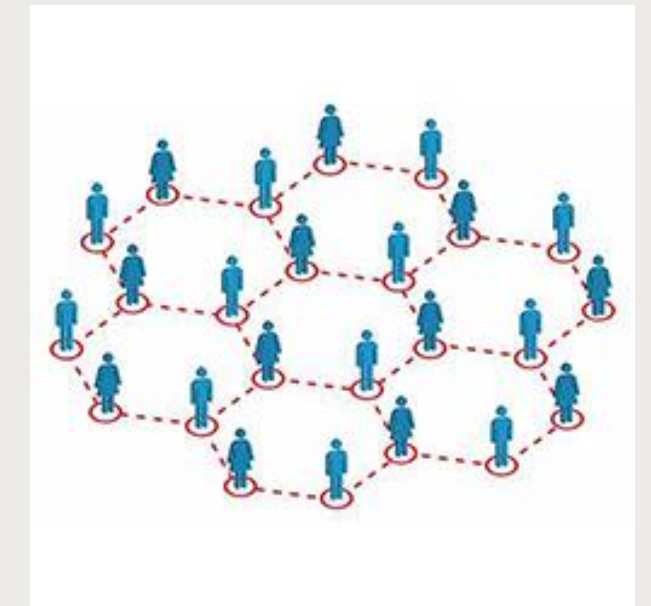
- Provide vehicles with a common (base) specification (with option to tailor buses according to specific needs)
→ **standardisation and economies of scale.**
- Allow consolidated call off orders to be placed.
- Enable other cities (from across Europe) and bus operators to procure buses under similar terms – mechanism for rapid purchase of FC buses.
- Live for four years from 2018.



Risks and Challenges



- **Joint procurement exercises: not always the most appropriate model** to facilitate the commercialisation of fuel cell buses – linking projects has downsides as well as benefits
- **Multiple sources of funding** – means FCH 2 JU funding is well leveraged, but this adds complexity and timescale challenges
- **Need to procure HRS / H₂ supplies in parallel with buses** – fuel costs are a critical element of the total cost of ownership
- Challenge for cities / operators to commit to ordering large fleets without full certainty over lifetime costs → **“all-in” offers may be attractive to early adopters**



Communications Activities – Zero Emission Bus Conference



The Zero Emission Bus conference will bring together 300 policy makers, bus operators and industry experts to drive forward the *realisation of zero emission public transport* for Europe.

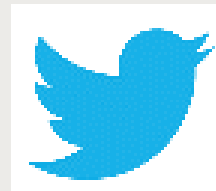
National and regional policy makers are under increasing pressure to provide clean solutions for the transport sector to improve air quality across Europe's cities and regions. The Zero Emission Bus (ZEB) conference aims to provide these solutions and inform policy makers of the different options available to them from the *battery and fuel cell electric bus* industries.

For more information and to register – see:

www.zebconference.com/eu

Spread the word: @euzebconference
#ZEB2018

<https://www.fuelcellbuses.eu/projects/jive>



@fuelcellbus



2018 EUROPEAN
ZERO EMISSION BUS
CONFERENCE

Cologne • November 27 & 28th



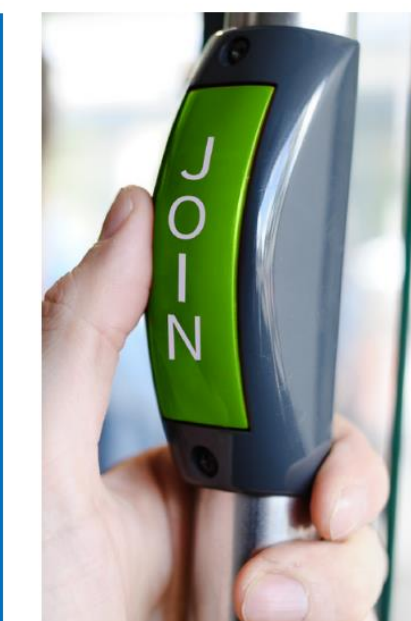
2018 EUROPEAN
ZERO EMISSION BUS
CONFERENCE



27 & 28 November 2018
Flora, Cologne

Details & Registration:
zebconference.com/eu

@EUZEBconference #ZEB2018

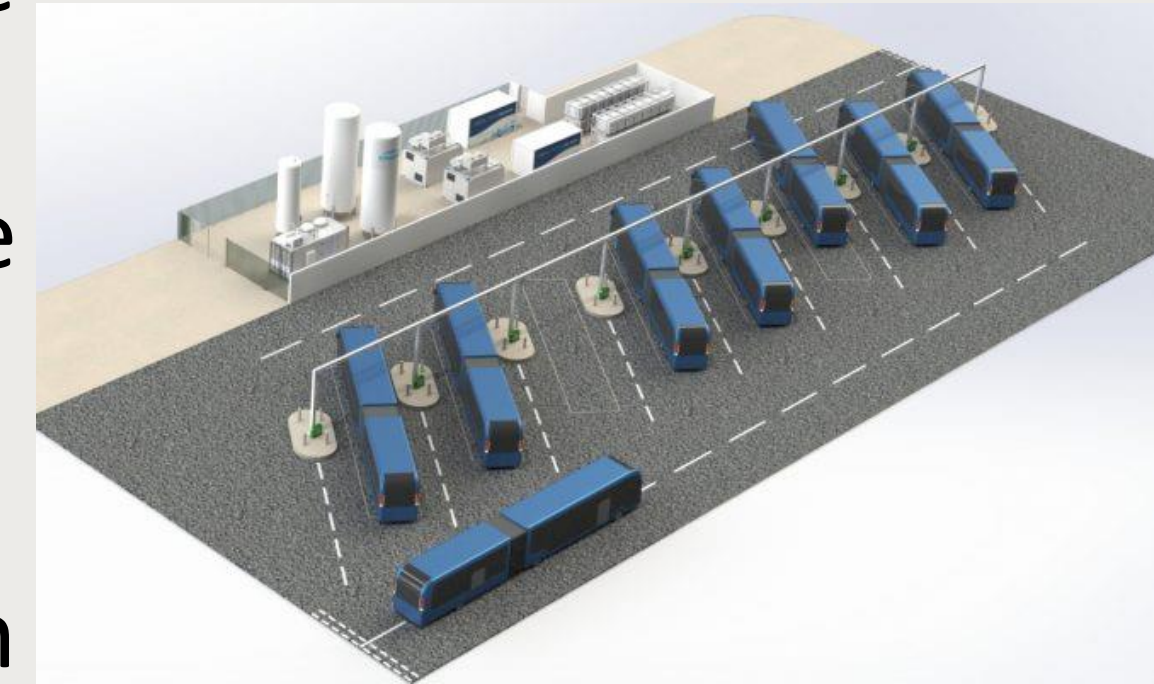


Beyond JIVE – commercial deployment phase



Several players are now looking at how to move to the next, commercial phase beyond the JIVE deployments. Key factors:

- **Scale of bus demand** – hundreds of units per year appear to provide adequate cost reductions
- **Scale of demand at a depot** – required to reduce H₂ price
- **Access to low cost energy** – critical to achieving affordable hydrogen, best option is location dependent



Achieving this will require continued commitment to zero emission policies, without prejudice against hydrogen and willingness from operators to commit to large scale fleets, ideally in concerted procurements.

Hydrogen could be the most affordable and most flexible zero emission option for urban buses, particularly for challenging routes (high daily mileage, large vehicles etc.).





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