Programme Review Days 2014

Commercialisation Strategy for Fuel Cell Electric Buses in Europe

www.fch-ju.eu

Carlos Navas, Project Manager

1. Background and project objectives
2. First results
3. Next steps

Main objective of the study is to identify locations that implement large-scale FC bus demonstration projects and support preparation

Background of the study

> FCH JU launched a **commercialisation effort** for alternative bus powertrains in Europe in 2012

> Alternative powertrain solutions have been evaluated – **FC buses with greatest operational flexibility and zero emissions**[1)]

> **FC bus TCO** is currently **217%** of diesel buses – Needs to be reduced for commercialisation

Study **Goals**

> **Bridging the gap** until full technology maturity and competitiveness within the bus market

> **Mobilising European bus operators** to reach critical number of buses for unit cost reduction

> Providing **cost analyses** for European cities and bus operators for future large-scale FC bus deployment

> **Development of regional clusters** deploying 500 – 1,000 FC buses in total, supported by the FCH JU in
1.) Engineering of large-scale HRS infrastructure
2.) Realising demonstration projects (2017 – 2020)

1) FCH JU Study "Urban buses: Alternative powertrains for Europe"

The FCH JU pursues a bold vision of commercialising Fuel Cell Electric Buses – Current study to assess costs for cities/operators

Current study

- Local high-level cost analyses
- Mobilisation of interested locations
- Preparation joint procurement
- Engineering of H_2 refueling infrastructure

2014-2015

- Detailed cost analyses
- JTI
- Grant application for demo project
- EU roadmap/ discussion on regulation

2016

- Execution of demo projects
- Local, national and EU funding schemes for demos
- Regulations framework to support roll-out

2017-2020

Scale effects
Incentives
Regulation

VISION –
FC electric buses commercially viable and rolled-out in Europe

2020 onwards

The study brings together all stakeholders to foster a dialogue and build commitment for large-scale roll-out of FC buses

Bus operators/local governments/PTAs
(demand side)

Coalition

Bus, infrastructure and H_2 providers
(supply side)

Study provides transparency on costs to allow for informed decision on FC bus roll-out

- > Facilitate specification of future product characteristics with OEMs
- > Support assessment of level of preparedness to roll-out FC buses
- > Provide lessons learnt and support to engage local stakeholders

Experiences and lessons learnt

Operational requirements and solutions

Cost-down potential and cost analyses

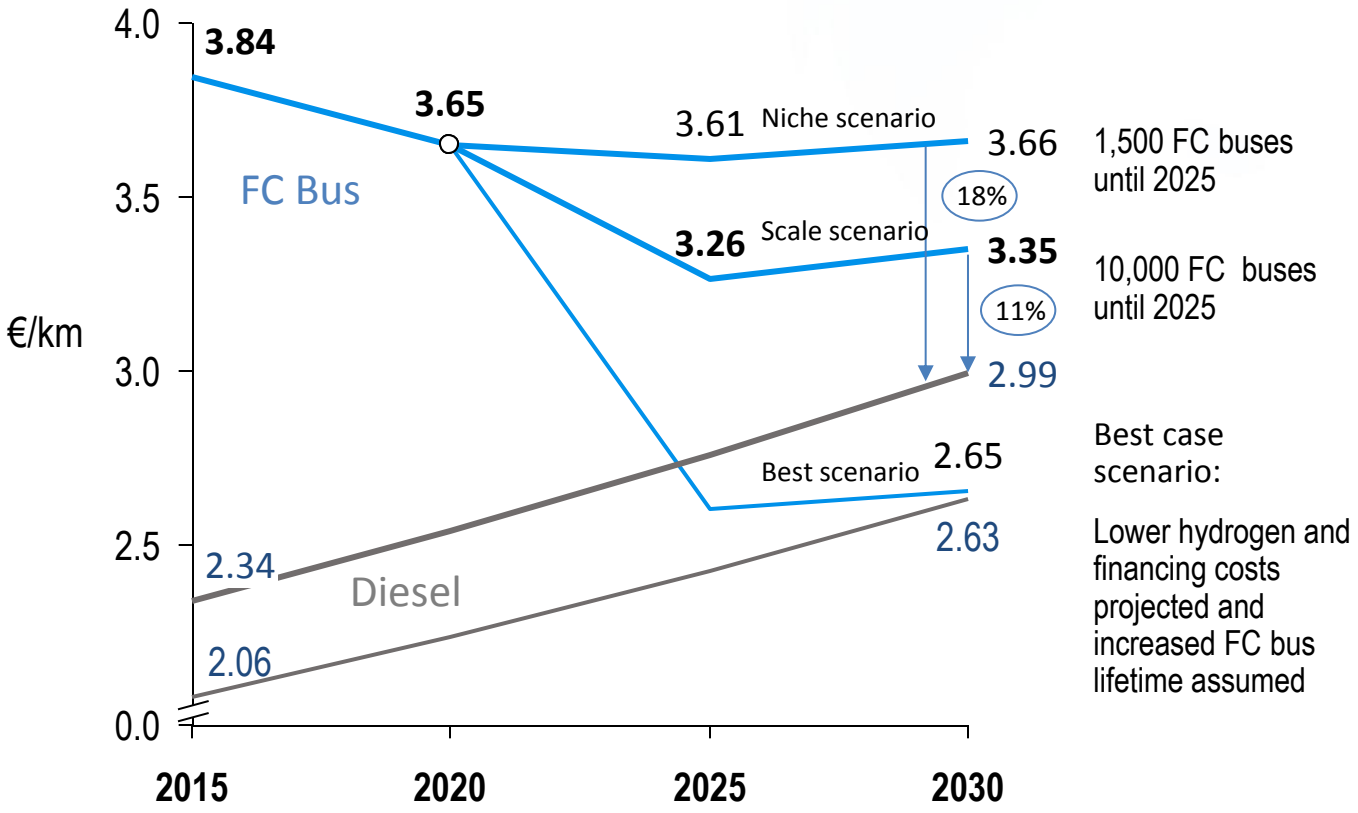
Study facilitates market valuation and product development in cooperation with customers

- > Define technical specifications and performance of future FC buses
- > Determine scale effects and cost-down curves
- > Assess large-scale deployment solutions

Commitment for roll-out and large-scale demos

The study assessed FC bus deployment costs to support locations in determining financing gap – Cost premium remains

Total Servicing Cost development scenarios

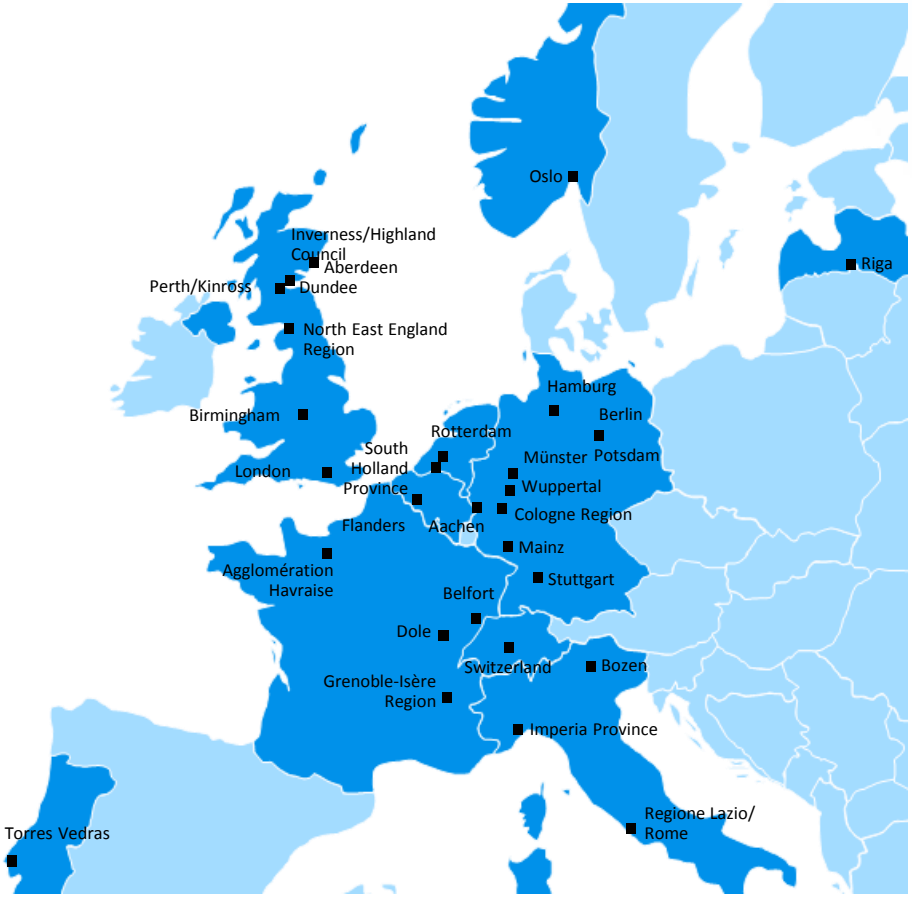


- Deploying more buses earlier will support scale effects and cost reduction
- More locations as first-movers need to be mobilised
- TSC gap to the diesel bus expected to decrease to 11%, can remain higher, though
- Synergies with fuel cell passenger car industry offer further significant cost reduction potential (not depicted here)

TSC = Total Servicing Cost: TCO plus diesel bus replacement cost due to lower availability of FC buses

A coalition of industry and public stakeholders has been established – Operators and local governments from 30 locations participating

Participating locations interested in FC Bus roll-out



Industry coalition members

Bus manufacturers

VANHOOL, MAN, SOLARIS, ŠKODA, EvoBus, APTS, VDL BUS & COACH

Infrastructure/ H_2 providers

H2 Logic, Shell, Ballast Nedam, Linde, AIR LIQUIDE, ITM POWER, AIR PRODUCTS, SIEMENS, HYDROGENICS, McPhy

Technology providers

HYDROGENICS, BALLARD, SIEMENS, PM, Intelligent Energy

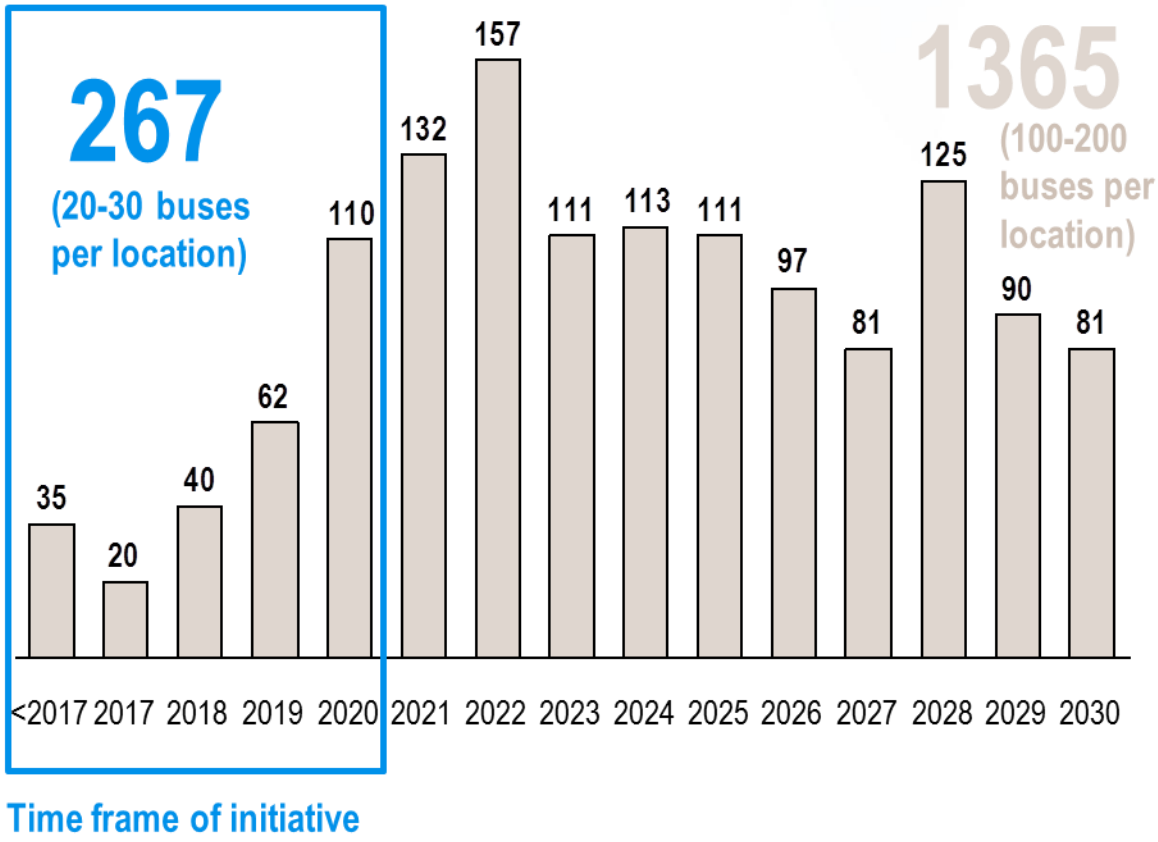
Other organisations

Government of the Netherlands, VRR, NOW, hySOLUTIONS, VDV Die Verkehrsunternehmen, HyCologne, EnergieRegion.NRW, iit

Initial indications for FC bus deployment plans of operators are rather conservative – Further mobilisation and support is crucial

Overview planned FC bus deployment

Preliminary results



> **On average, locations plan to deploy 22 FC buses by 2020** – if every participating location does so, approx. **650 FC buses could be reached** in total

> **Participants require further support** in project validation, cost assessment and engaging local governments to ensure project financing

> **Results are highly preliminary** as only 12 locations indicated planned replacement schemes so far – only 7 provided information beyond 2020

> **Further results expected** by end of the year

To engage local politicians and operators´ executive level, line of argumentation to invest in FC Buses has been developed

Storyline high-level presentation for dissemination

A What is a FC bus? – It is an electric bus with a fuel cell and battery powertrain, running on hydrogen

B What does it cost? – The costs are expected to decrease with a remaining cost premium of 11-18%

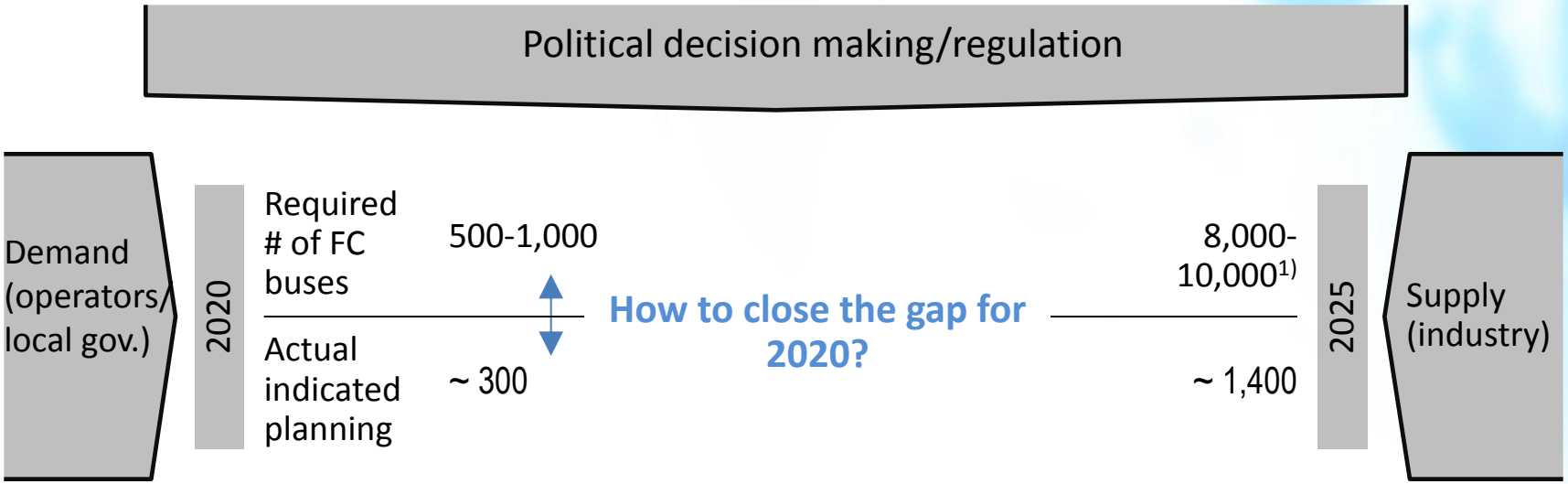
C How is it beneficial to pay the premium? – Investing in FC Buses pays off in many ways

1	Politically:	There is a push for decarbonizing public transport, stricter regulation is expected
2	Environmentally:	FC Buses help green cities and reduce noise levels
3	Operationally:	FC Buses are the most convenient zero emissions option
4	Economically:	FC Buses reduce external costs of public transport and energy production
5	Organizationally:	The FC Bus Coalition and FCH JU support operators to introduce FC Buses

D Do they work in practice and are they safe? – Yes, numerous European cities are running FC Buses in daily operation and they are convinced

E We hope that you will join or support the FC Bus Coalition and explore options for a FC bus roll-out in your city

Taking the first hurdle of a critical number of buses until 2020 will be critical – We need full support of all coalition members



Challenges to be addressed within the study framework and beyond:

- Reach critical mass to establish commercial market, i.e. 500-1,000 FC buses in 2020
- Engage political decision makers to ensure high level support for long term roll-out
- Pursue a cost-benefit storyline that shows FC buses make sense, even if more expensive in next years
- Support operators in preparing for FC bus roll-out
- Set up FCH JU funding scheme to bridge parts of financing gap (incl. conditions on demo size)
- Seizing buses and the demo projects to push fuel cells in transport on a strategic level
- Lobbying for favourable regulatory scheme
- Success beyond 2020 will also depend on "game changing" decisions in 2017/2018

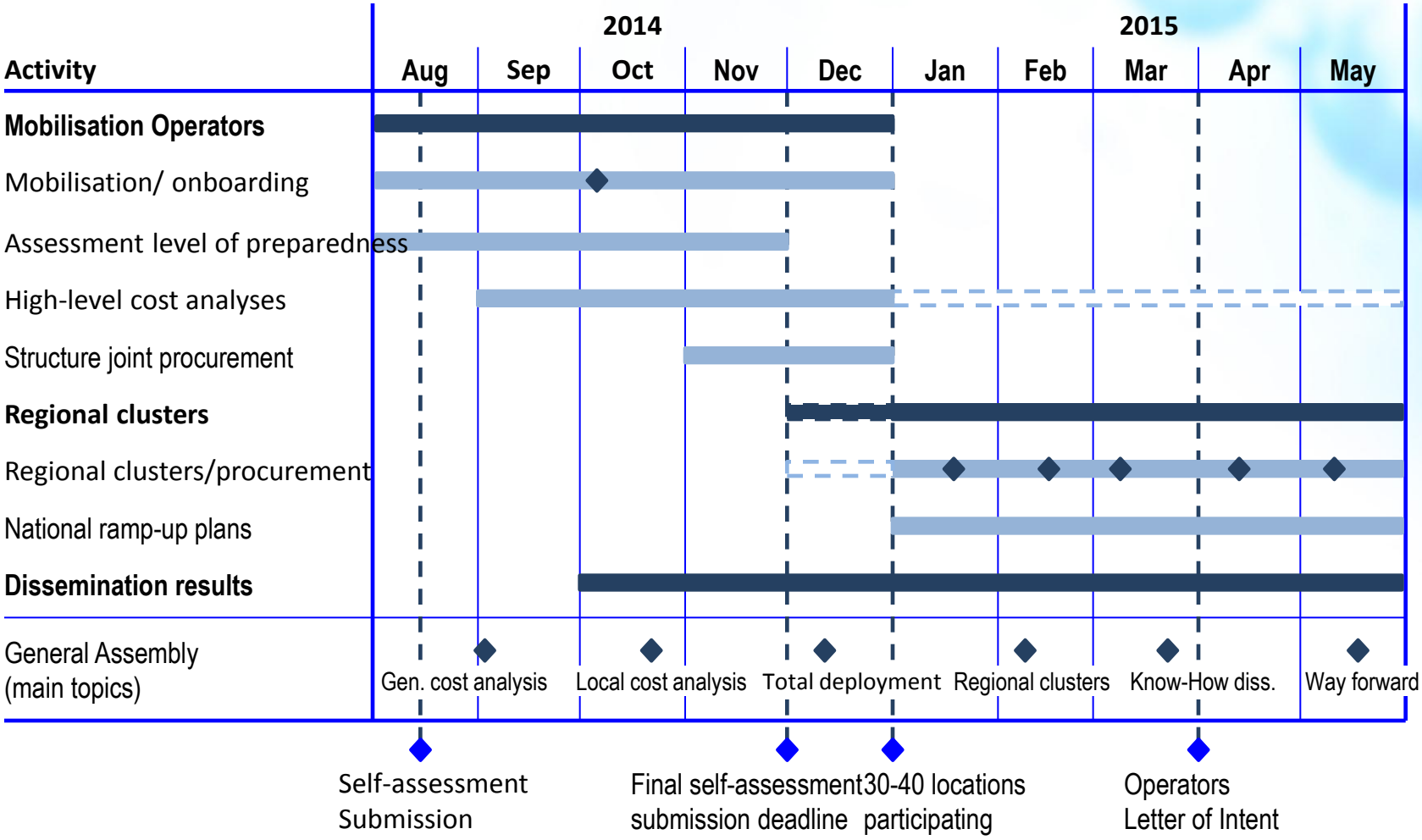
1) Total number of FC Buses required to reach cost down projections as per study results potential passenger car synergy effects not taken into account)

The next phase of the study until May 2015 will focus on further supporting operators and cities

Overview next steps

1. Analyse bus purchasing **price sensitivities** – Analysing which bus target price is required for commercialisation, which funding support can be expected from the FCH JU and whether the number of 500-1,000 FC Buses will be achieved
2. Increase level of **commitment** – Supporting participants in stakeholder communication and decision making by signing of a Letter of Understanding for bus roll-out (to be signed by operators and local governments)
3. Prepare for **joint procurement** – Assessing implications of a joint procurement approach and forming regional clusters of interested locations to structure joint procurement
4. **Disseminate** know-how and lessons learnt – Supporting operators in analysing local costs and benefits of FC bus deployment, disseminating lessons learnt from previous projects

A complete picture of roll-out plans and deployment commitment shall be available by end of the year



Thank you for your attention!

Further info:

- FCH JU: http://fch-ju.eu
- NEW-IG: http://www.new-ig.eu
- N.ERGHY: http://www.nerghy.eu