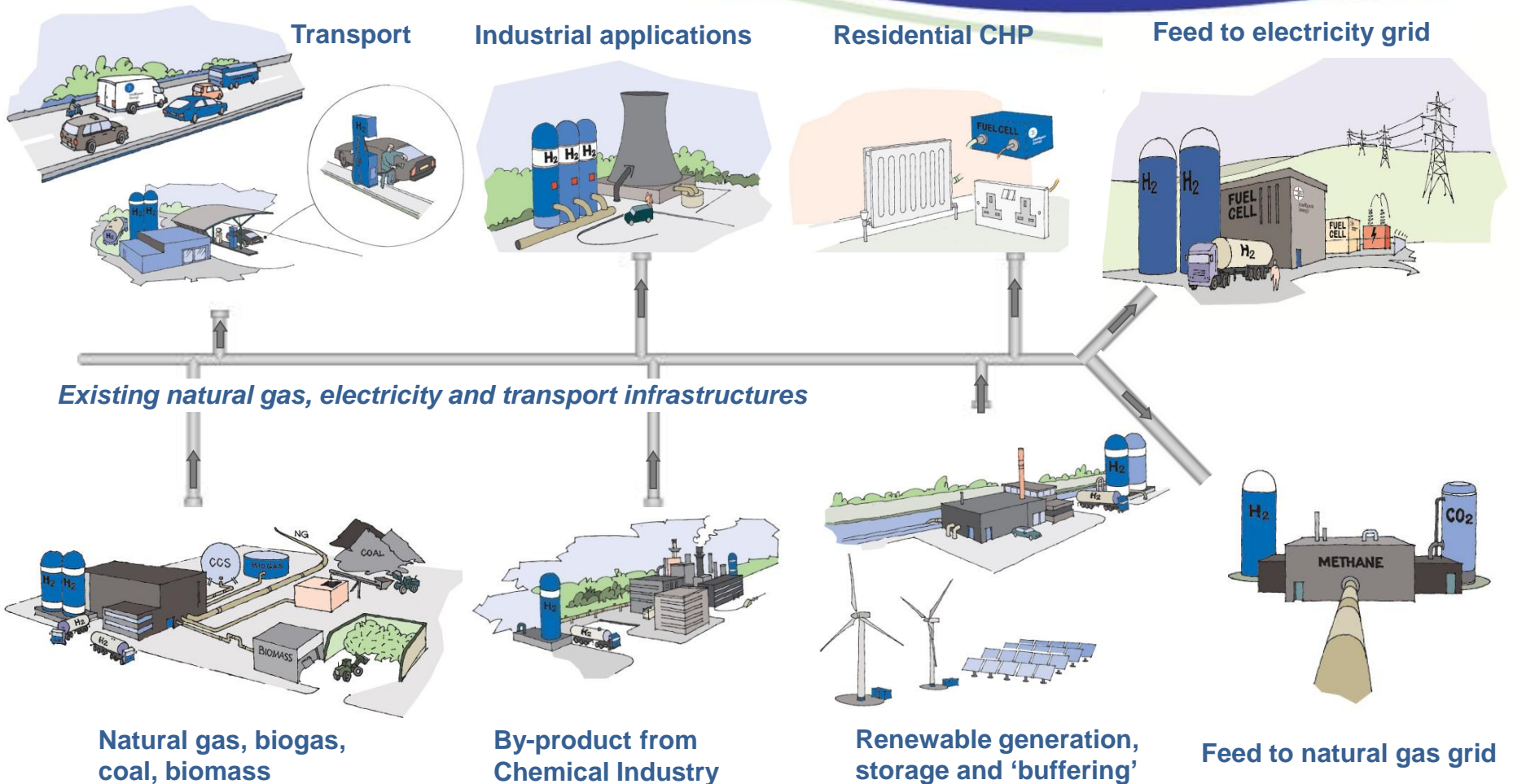




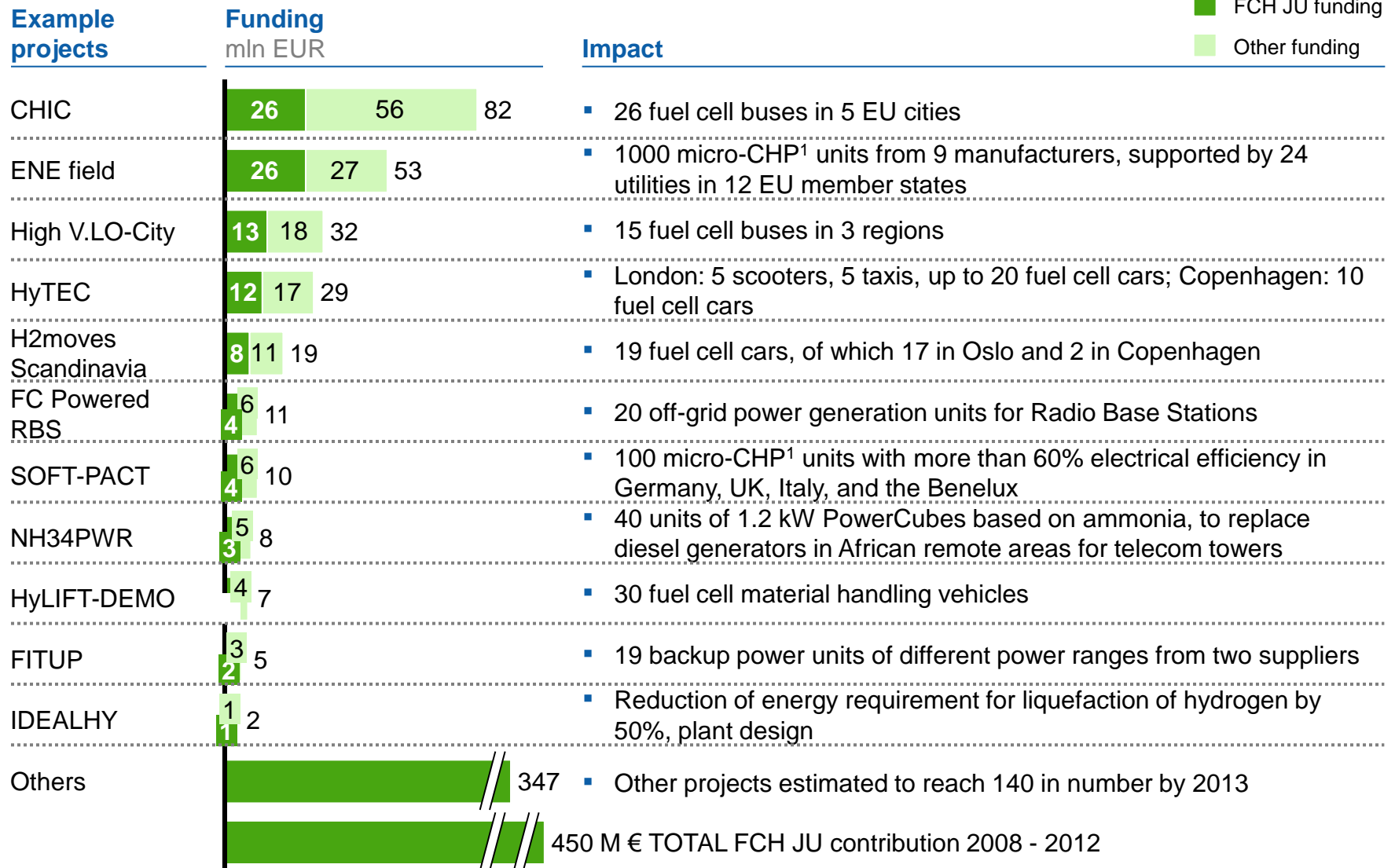
The Fuel Cells and Hydrogen Joint Undertaking

Bert De Colvenaer, Executive Director
Paris, 12 October 2012

Self Reliant in Energy Provision with Fuel Cells and Hydrogen



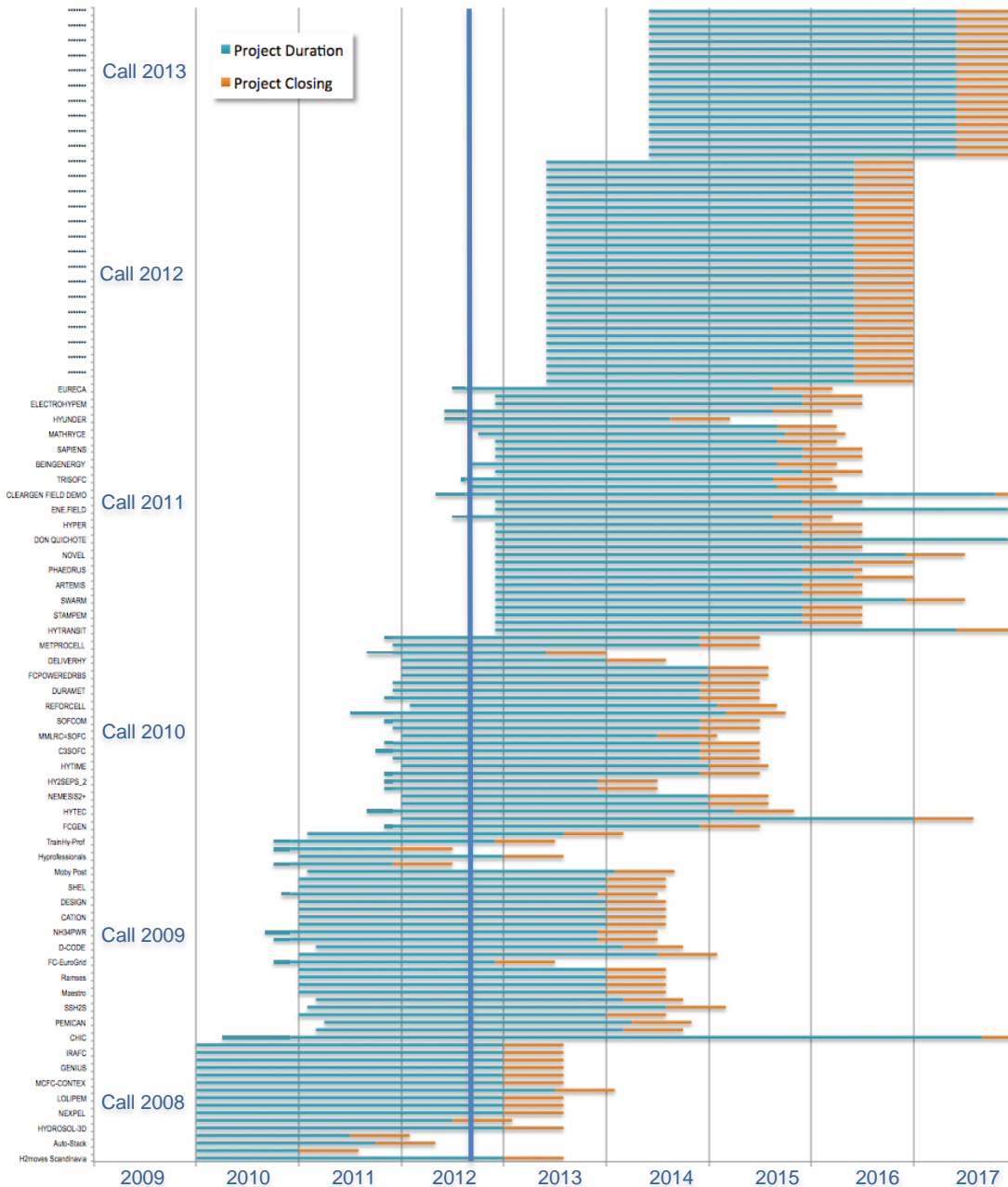
The FCH JU success stories



FCH JU funding
 Other funding

¹ Combined Heat and Power

FCH JU project portfolio



Operational

- 6 projects closed
- 91 projects running
- 305 M € spent
- + industry/research in kind
- Project peak still to come

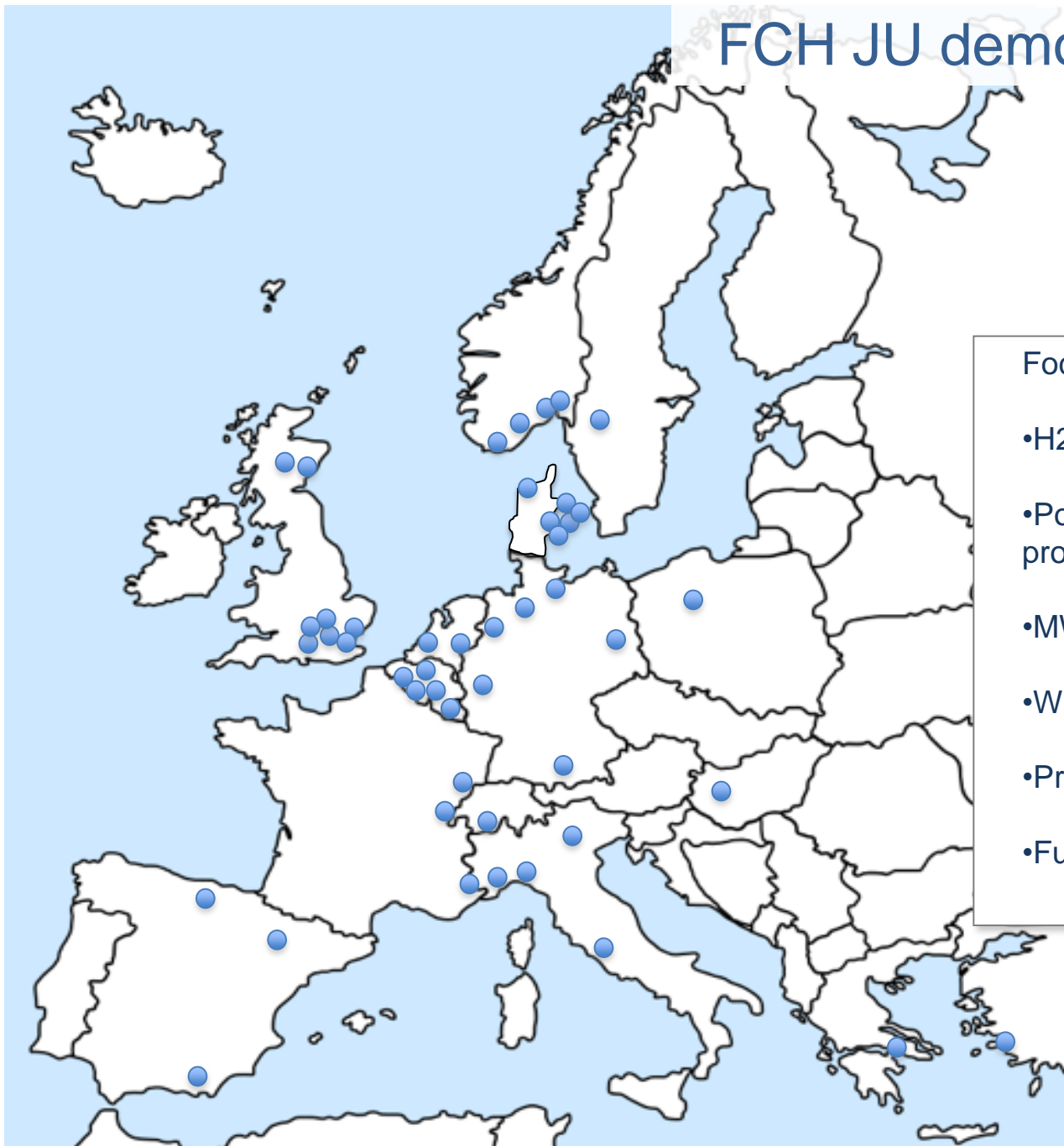
Administrative

- Improved all processes
- Control systems working well

Governance

- Governing Board
- Scientific Committee
- State Representative Group
- European Parliament and Council

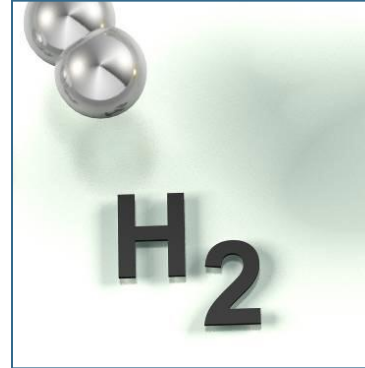
FCH JU demonstration projects



Focus points :

- H2 mobility activities
- Potential of large hydrogen production & storage
- MW scale experience
- Wide early market benefits
- Pro-active safety management
- Fully exploit “joining forces”

Urban buses: alternative powertrains for Europe



A fact-based analysis of the role of diesel hybrid, hydrogen fuel cell, trolley and electric powertrains

The coalition of more than 40 industrial companies and organizations

Bus OEMs	Technology Providers	Infrastructure	Transportation Companies	Other organizations

1 Bombardier, Hydrogenics and ABB participate in both the Technology Providers and the Infrastructure working groups

In depth analysis of 8 different powertrains for standard and articulated bus

1. Diesel powertrain

- **Conventional** diesel combustion engine

2. CNG powertrain

- **Conventional** CNG combustion engine

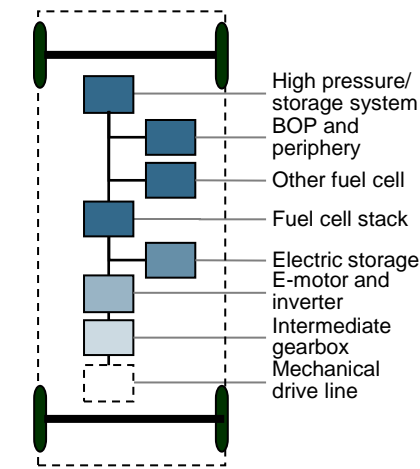
3. Parallel hybrid powertrain

- **Parallel** hybrid configuration of electric and ICE drive
- Fully electric driving for **smaller distances** (<2 km)

4. Serial hybrid powertrain

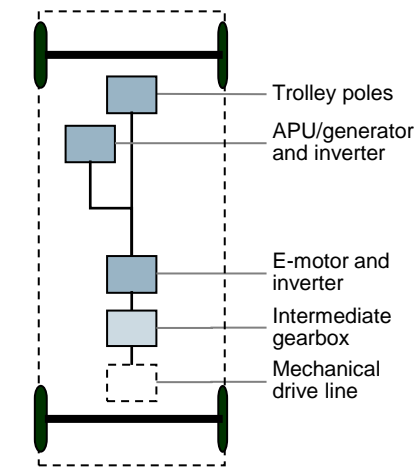
- **Serial** hybrid configuration of dominating electric system
- Fully electric driving for **smaller distances** (<10 km); larger range possible depending on capacity of battery

5. Hydrogen fuel cell powertrain



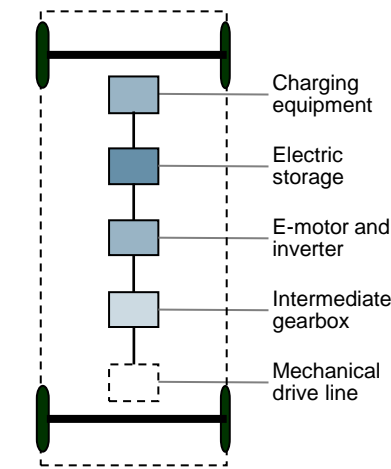
- **Serial hybrid** configuration of fuel cell system and electric drive
- Hydrogen tank pressure typically 350 or 700 bar

6. Trolley powertrain



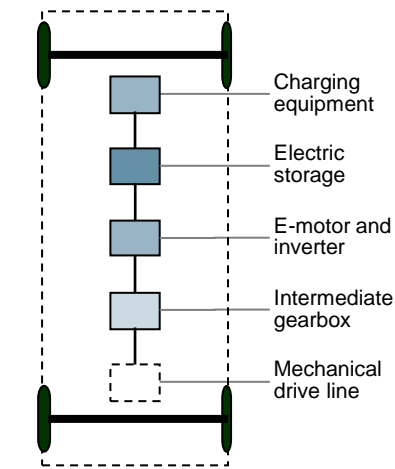
- **Purely electric** drive
- Electric energy taken **from the overhead wiring** while driving

7. Opportunity e-bus



- **Purely electric** drive
- Only charging of battery **from the grid** while stationary at intermediate stops (e.g. via an overhead catenary system)

8. Overnight e-bus



- **Purely electric** drive
- Only charging of battery **from the grid** while stationary at the depot

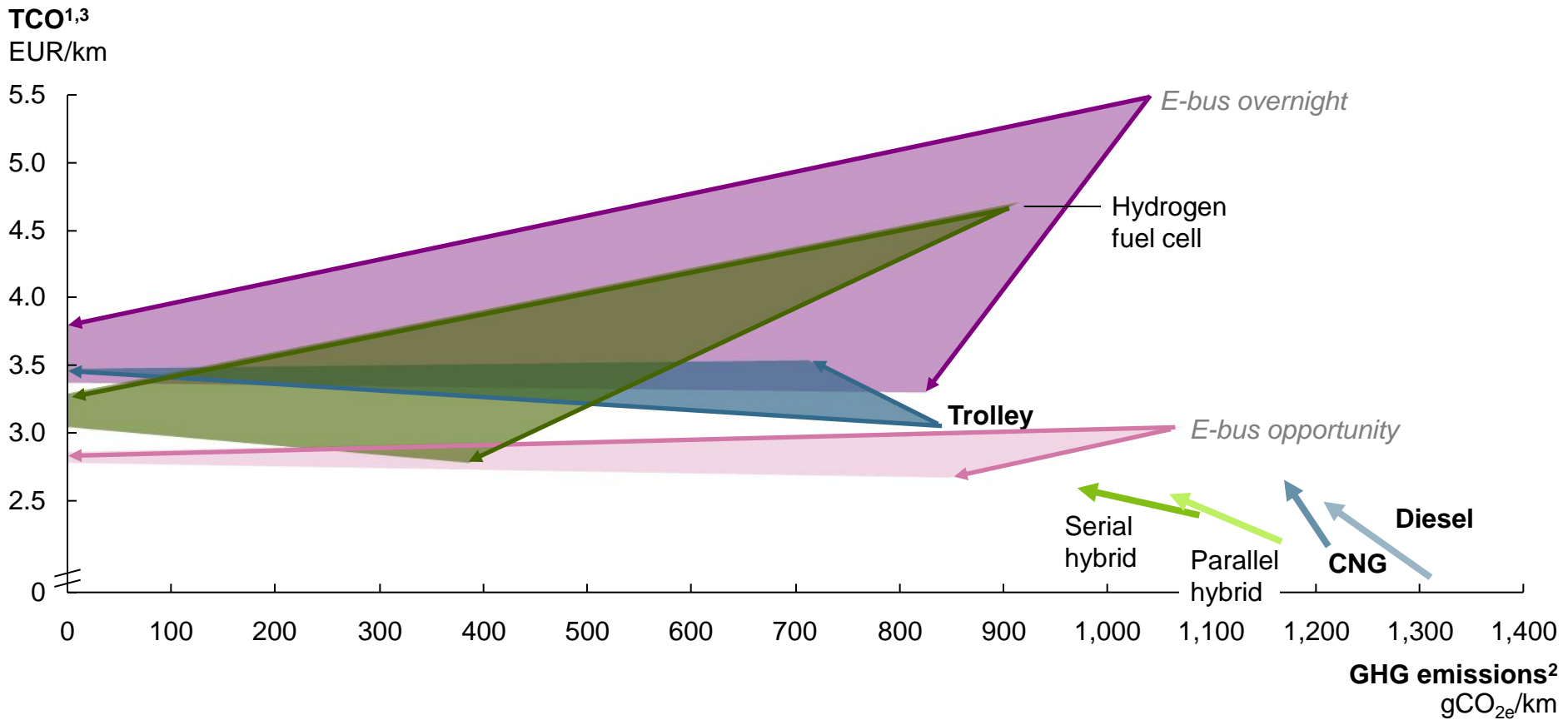
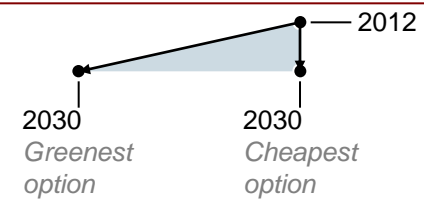
E-bus opportunity and hydrogen fuel cell expected to be the cheapest zero local-emission standard bus by 2030

WELL-TO-WHEEL

STANDARD

Labeling of powertrain according degrees of operational experience (kilometers driven):

- Commercial solution (>> 100 million km): Conventional, trolley
- Test fleets (> 1 million km): Diesel hybrids, fuel cell
- Prototype phase (< 10 thousand km): E-buses



1 Total cost of ownership for a 12m bus including purchase, running and financing costs based on 60,000km annual mileage and 12 years bus lifetime – not all powertrains available for articulated buses therefore articulated buses not shown

2 Total CO_{2e} emissions per bus per km for different fuel types from well-to-wheel

3 Electricity cost for e-bus and water electrolysis part of hydrogen production based on renewable electricity price with a premium of EUR50/MWh over normal electricity

SOURCE: Clean team; working team analysis

- The new financial framework : Horizon 2020
 - Simplification
 - Appropriate financing tools
 - Stronger cooperation with Member States
 - Smooth transition towards 2014 – 2020
- Important FCH JU event :
Program Review Days

28 & 29 November
Charlemagne building





Thank you for your attention !

Further info :

- FCH JU : <http://fch-ju.eu>
- NEW-IG : <http://www.fchindustry-jti.eu>
- N.ERGHY : <http://www.nerghy.eu>