



*Improving co-operation between regional programs and the
FCH Joint Undertaking: **Hamburg***

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Climate Protection in Hamburg

- European Green Capital 2011
- Promotion of energy efficient technologies
- Decrease CO₂-emissions by 40% until 2020 through climate action plan*
- Including hydrogen and fuel cell projects as core activities



* Based on 1990

Projects



Hamburg ferry first to use hydrogen power

THE world's first fuelcell hydrogen ship that is powered by hydrogen will enter service in the summer of 2016, reports the German press.

The 120 passenger ferry will operate on Lake Alster in the centre of Hamburg and will be a prototype for hydrogen-powered ferries.

The green ferry is expected to be the world's first hydrogen ferry project, which began at the end of last year, initially



Clean City Cars

- Introduction of 500 Daimler fuel cell cars intended until 2015
- Co-operation of the City of Hamburg, Daimler AG, Total, Shell and Vattenfall
- Base for future infrastructure – starting in 2010
- 4 more publicly accessible refuelling stations planned until 2015.



New Citaro FuelCELL-Hybrid



Next generation fuel cell buses are characterized by:

- Optimized fuel cell system and fuel cell operation strategy
- Use of passenger car modules
- Optimized drive train concept
- Integrated energy accumulator - lithium-ion high voltage battery
- Electrified auxiliary system components
- Reduced weight of the bus (e.g. by reducing the number of gas cylinders due to better efficiencies - 350 bar Tank system)

Hydrogen Filling Station HafenCity

- 4 Hydrogen Filling stations in Hamburg so far
- Partners: Vattenfall and Shell
- New filling station is base for future infrastructure – opening 2010
- 800 kg hydrogen/day (50% production/50% trucked-in)
- Letter of Intent for funding and building permission received
- Negotiations with Shell and TOTAL concerning further sites



1. Electric Power for:

- Electrical Main Engine Start
- ECS (air conditioning etc.)
- Autonomous Taxiing
- Technical and commercial impact
- In-Flight (release of power units)
- Emergency power supply

2. Energy storage

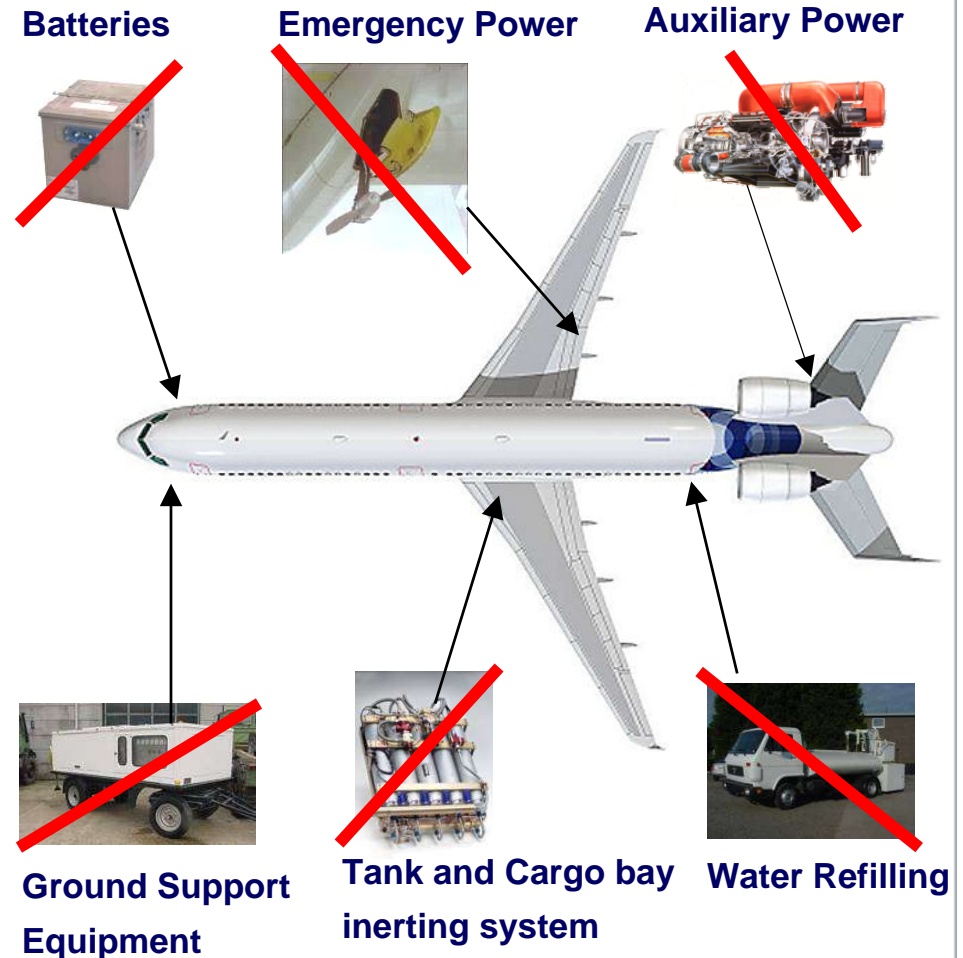
3. Water production

4. Inerting

5. Heat/electric power for

- Deicing (On-Ground)
- Avoiding of iced wings

Fuel Cell Lab in preparation



Fuel Cell vessel



- First passenger ship with fuel cell propulsion on inner city lake Alster
- Capacity: 100 passengers
- Allows zero emissions solutions in lakes, rivers, nature and water protection areas
- Two Hybrid Fuel Cell Systems with 50 kW peak each
- Start of service: August 2008



Fuel Cells for ships

- Integrated project - objectives: definition, evaluation and demonstration of the supply of auxiliary power units on seagoing vessels
- Test application onshore and at sea
- Usage of different types of fuel (Gas, Second generation synthetic fuels)
- Alternative to clean power supply from land



E-mobility



- ▶ Specialized city-cars
- ▶ Little footprint in terms of space
- ▶ Ideal for multi-modal mobility service

Fleet operation



- ▶ High operating grade
- ▶ Highly environmentally friendly
- ▶ Highly economic

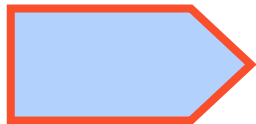
H₂/FC-vehicles



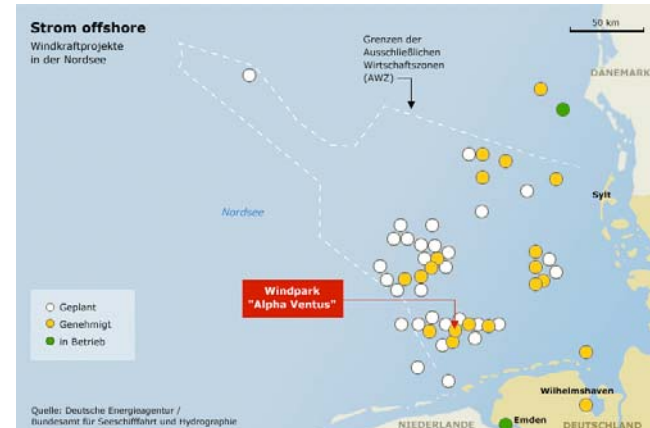
- ▶ Buses and Multi-purpose vehicles
- ▶ Low emissions for long range
- ▶ Public transport is a perfect match for the concept of e-mobility

Wind as source for clean power

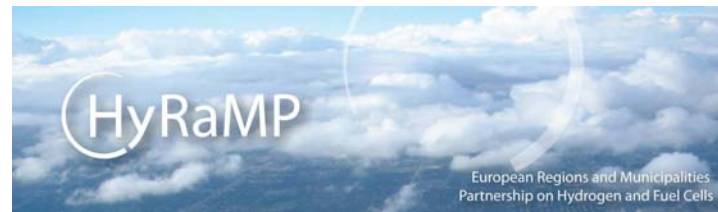
- Actual capacity of wind-farms ca. 20 GW (mostly onshore) in Northern Germany
- Another 25 GW currently under planning (mostly offshore until 2030)
- Losses in peak load due to insufficient grid today and even higher in the future



Research project for wind/hydrogen network in preparation



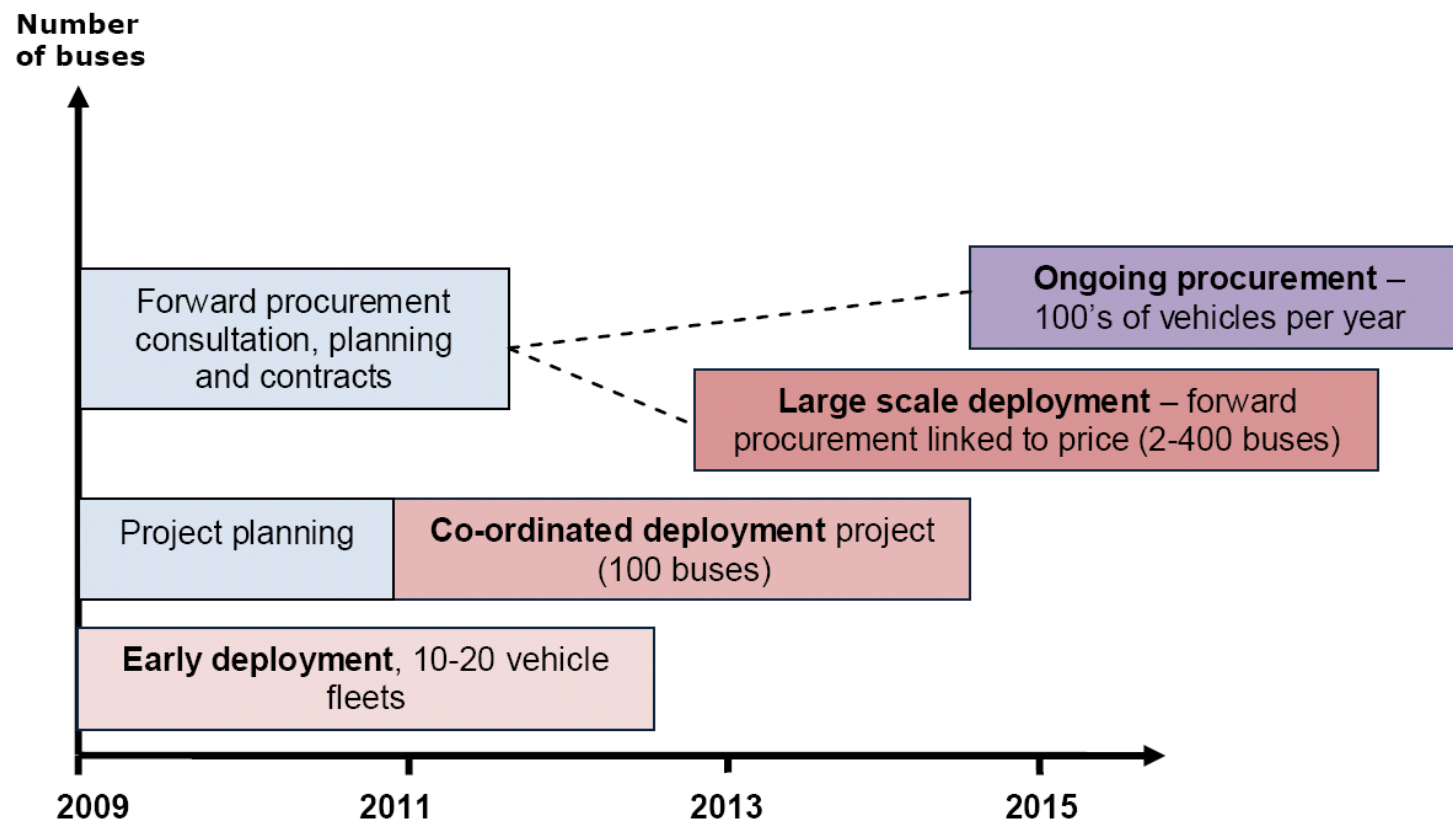
- HyRaMP and Hydrogen Bus Alliance co-operate in the deployment of bus fleets and vehicles
- **Objective:** Economies of Scale, Market Viability
- Joint evaluation of technical performance and operational parameters
- Pre commercial development of vehicles but adequate to market
- Overcome prototype status
- Harmonisation of European Calls and deployment of vehicles

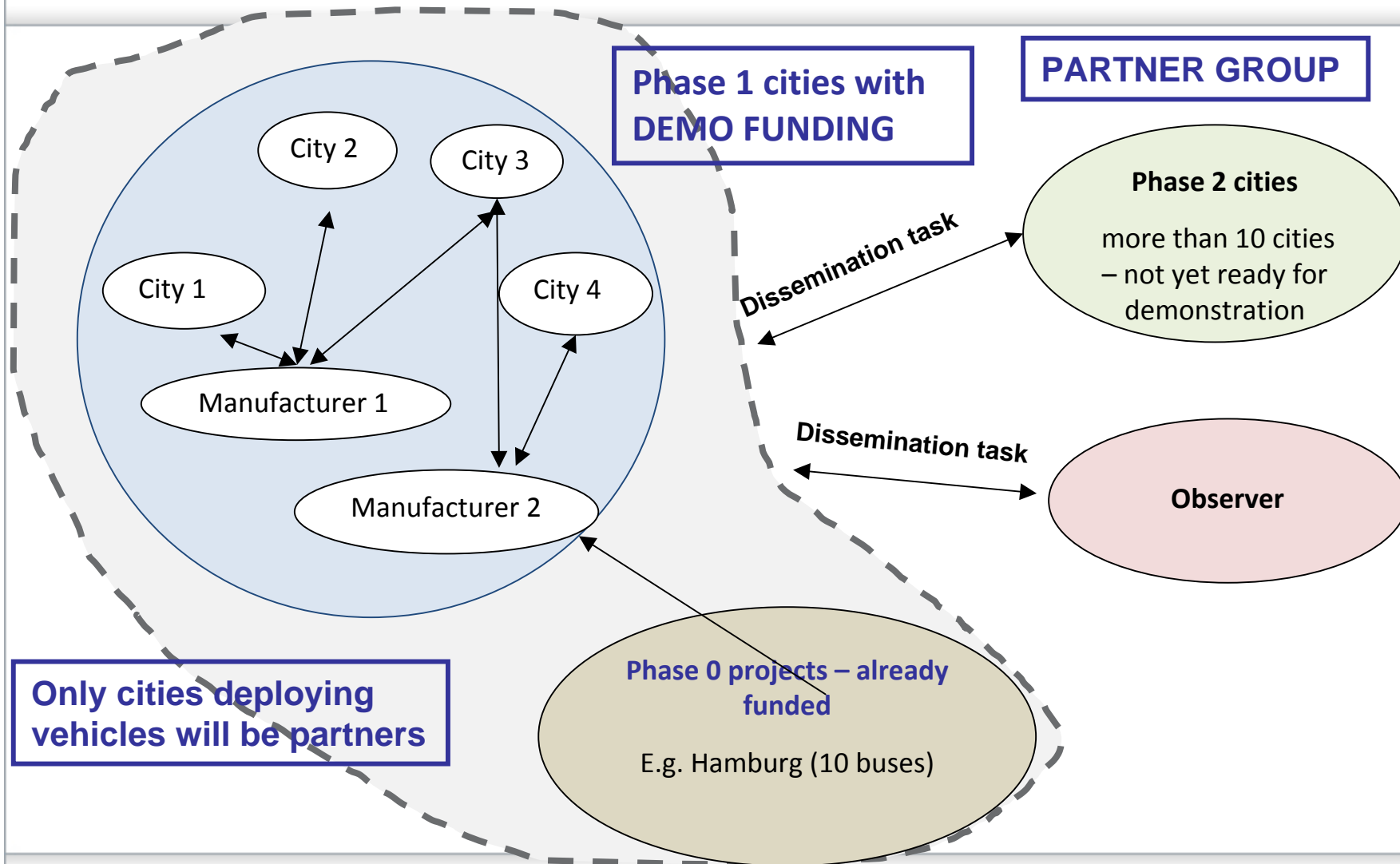


- Build Up of infrastructure network in Europe
- **Local Level:** Multiple Utilisation of Refuelling Infrastructure intended
- **European Level:** Road-Map for infrastructure to be prepared (Scandinavian Hydrogen Hyway, Munich-Modena, German Hyway)
- Joint activities from industry (Gas suppliers, oil companies etc.)
- Infrastructure network to be matched with vehicle deployment
- Harmonisation of Codes and Standards required
- European register for hydrogen resources and definition of exploitation activities

HBA Strategy 2010-2015

The Alliance recently completed a detailed strategy for 2010-2015.





Thank you very much
for your attention!