



Electromobility in Hamburg: Status of projects and current developments

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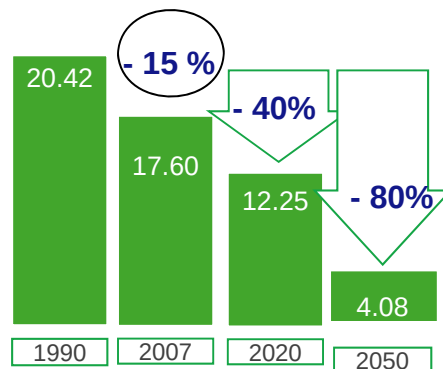
Hamburg: Booming trade and service metropolis



- The metropolitan region of Hamburg:
Home to 4.3 million people
1.8 million of in the city centre.
- Over 300,000 daily commuters
- Highly industrialized, densely populated economic hub with over 500 industrial enterprises and home to Europe's third largest port.
- Creative media centre, growing population

Climate Action in Hamburg

- Hamburg, awarded by EC as European Green Capital 2011, promotes a wide range of energy efficient technologies
- The ambitious Climate Action Plan covers more than 360 projects and measures to cut CO₂-emissions by 2 m. tons from 2007 - 2012 and to reduce the overall carbon footprint by 40 % until 2020 (compared to baseline 1990). The city budget provides an additional annual funding of 25 m. Euro (approx. 120 m. Euro up to 2012).



Criteria:

- High environmental standards
- Ambitious goals
- Potential to be a role model and an inspiration for other cities

“The future success of climate and environmental protection in Europe is crucially dependent on management of resources, particularly in reference to energy cities and climate.

Cities with their capacity for innovation hold the greatest potential to contribute toward finding solutions to environmental problems”.



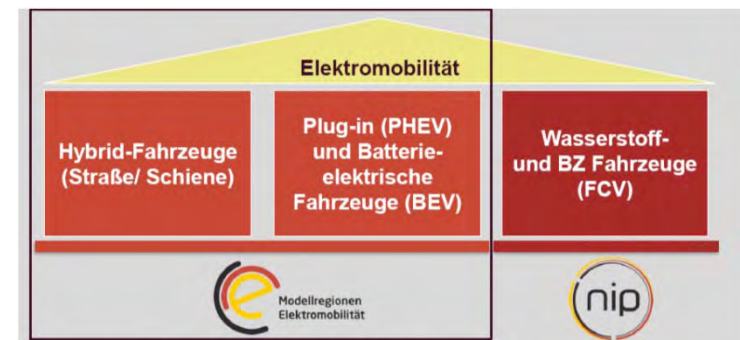
Model regions for electromobility

- Hamburg is one of eight German model regions.
- Funding volume in total EUR 115 m., funding period 2010/2011 about EUR 9.5 m. in Hamburg; the follow-up period until 2014 is currently discussed.
- hySOLUTIONS is the regional coordination centre
- Main objectives are the on-road test of mobility concepts, vehicles, technical components and technical interfaces.
- Battery electric and hybrid vehicles will be integrated in an overall system with fuel cells and hydrogen.
- No competition of electric vehicles and public transport.



8 model regions

- Berlin-Potsdam
- Bremen-Oldenburg
- Hamburg
- München
- Rhein-Ruhr
- Rhein-Main
- Dresden-Leipzig
- Stuttgart



Strategy for e-mobility

- Fuel Cell and battery powered electric vehicles are part of the same coherent technological pathway.
- Fuel cell and battery vehicles serve different mobility needs, but still there are technical synergies.
- Most important: the source of the primary energy source has to be green!
- Unsteady energy sources need an efficient storage solution. Storing overload capacity via the production of hydrogen or using virtual e-car parks (V2G) are viable pathways.



More than 600 renewable energy companies in the Hamburg area

Focussing on...

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

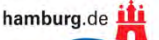
H₂-/FC-vehicles



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

Project overview

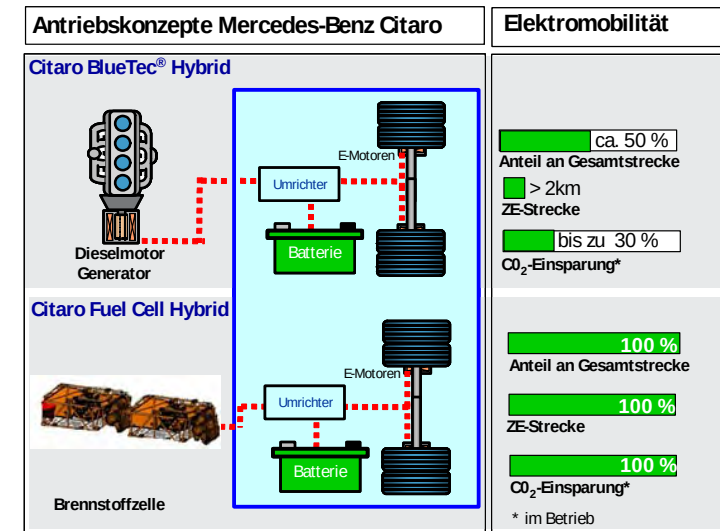
Model Region Electromobility Hamburg

Diesel-hybrid buses	hh=more	Hamburg PURE	hh=wise
Operation of DHB in regular passenger service Start of frequent procurement up to 10 EvoBus Citaro Diesel-hybrid buses (five in service)	Operation of cars in fleets Installation of public charging infrastructure Up to 100 public charging points, 50 % municipal operated 50 Smart Electric Drive 15 Mercedes E-Cell	Operation of cars by commercial users (fleet operators) 15 Renault Kangoo ZE (from 04/2011)	Operation of cars in commercial traffic: craft, trade, logistics and port management 20 Fiat E-Fiorino
Filling stations on the depots of HOCHBAHN	100 % green power, “discrimination-free” charging infrastructure, conformity with cityscape, regulatory issues regarding the establishment and operation of the charging infrastructure		
 HOCHBAHN EvoBus FFG HAMBURG	        	 RENAULT 	      

100 electric cars in commercial fleets

Fuel cell & diesel-hybrid buses

- Strategy approach of HOCHBAHN: serial hybrid (diesel and fuel Cell)
- One technology platform for fuel cell hydrogen Bus (FCHB) and diesel hybrid bus (DHB)
- DHB can operate in battery mode partly allowing zero emissions (low noise level & no pollution in sensitive urban areas)

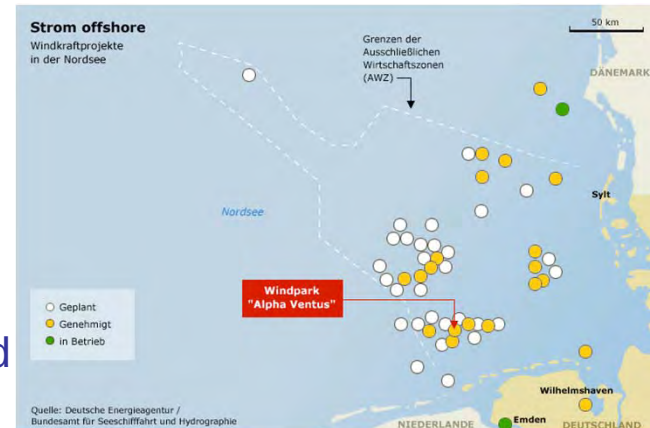


Source: Daimler

- Growing production numbers of DHB allow for substantial economies of scale effects, also benefiting cost reduction for FCHB in the mid to long term
- As long as fossil fuels can be purchased on the market at a “reasonable” price DHB functions as bridge technology to prepare for FCHB
- In midterm set new standards in public transport by decreasing emissions of buses to zero using FCHB and preparing in due time for the post fossil age

Wind as a source of clean power

- Actual capacity of wind-farms, about 20 GW (mostly onshore) in Northern Germany, another 25 GW currently under planning (mostly offshore until 2030)
- Losses in peak load: in 2020 there will be an estimated loss of 4 TW wind production due to delayed grid reinforcement and extension
- Research project for wind/hydrogen network has shown a significant potential for Hamburg with regard to traffic and industrial use of wind-generated hydrogen



Location policy and frame requirements

Requirements:

- Charging power is 100% green power from renewable sources
- “discrimination-free” charging infrastructure independent of supplier of electric energy
- Charging points compatible with cityscape



Assessment criteria for the allocation of charging points

Basic site suitability (exclusion criteria)

Obstacles in terms of:

- the availability of sites, the structural and technical suitability of the area (e.g. size, access, required cable length), urban issues.

Legal impediments in terms of:

- the status of the area (in development planning), specific standards (such as preservation, conservation, "green area regulations").

Evaluation of the site suitability

From the provider perspective:

- attractiveness / representativeness of the location, visibility to the public,
- extensibility.

From a user perspective:

- reachability, visibility, accessibility, attractiveness as a place of charging / centrality or location of specific user needs, link to public transport and other forms of environmental alliance, low pressure caused by "parking demand" by other vehicles.

Arbeitspaket 4.1 hh=more
Handlungsmuster für Energie- und Klimaschutz
Standortsuche für Ladeplätze

Bewertungsbogen

Standort: _____ Standort Nr.: _____

Lagebeschreibung (Lagetypus): _____

Grundsätzliche Standorteignung (Ausschlusskriterien)		ja	nein
Hinderungsgründe in Hinblick auf ...			
A.1	die Verfügbarkeit der Fläche		
A.2	die bauliche und technische Eignung der Fläche (z. B. Größe, Zugang, erforderliche Leitungslänge)		
A.3	stadtbauliche Belange		
rechtliche Hinderungsgründe in Hinblick auf ...			
A.4	den Status der Fläche (in der Bauleitplanung)		
A.5	spezielle Normen (z. B. Denkmalschutz, Naturschutz, GrünflächenVO, MüllabfuhrVO)		

Bewertung der Standorteignung				
... aus Anbieterperspektive		50%	Bewertung (z. bis 5)	Ergebnis
B.1	geringer baulicher Aufwand	10%		0,00
B.2	geringer elektrotechnischer Aufwand	10%		0,00
B.3	geringer Aufwand Verwaltungsvorfahren	5%		0,00
B.4	Attraktivität / Repräsentativität der Lage, Wahrnehmbarkeit für die Öffentlichkeit	20%		0,00
B.5	Erweiterbarkeit	5%		0,00
				0,00
... aus Nutzerperspektive		50%	Bewertung (z. bis 5)	Ergebnis
C.1	Erreichbarkeit, Erkennbarkeit, Zugänglichkeit	10%		0,00
C.2	Attraktivität als Ladestell / Zentralität oder Standortvorteile konkreter Nutzer	25%		0,00
C.3	Verknüpfung zum ÖV und anderen Formen des Umweltverbundes	10%		0,00
C.4	geringer "Parkdruck" durch andere Fahrzeuge	5%		0,00
				0,00
Gesamtpunktzahl (Minimum 1,00; Maximum 5,00)				0

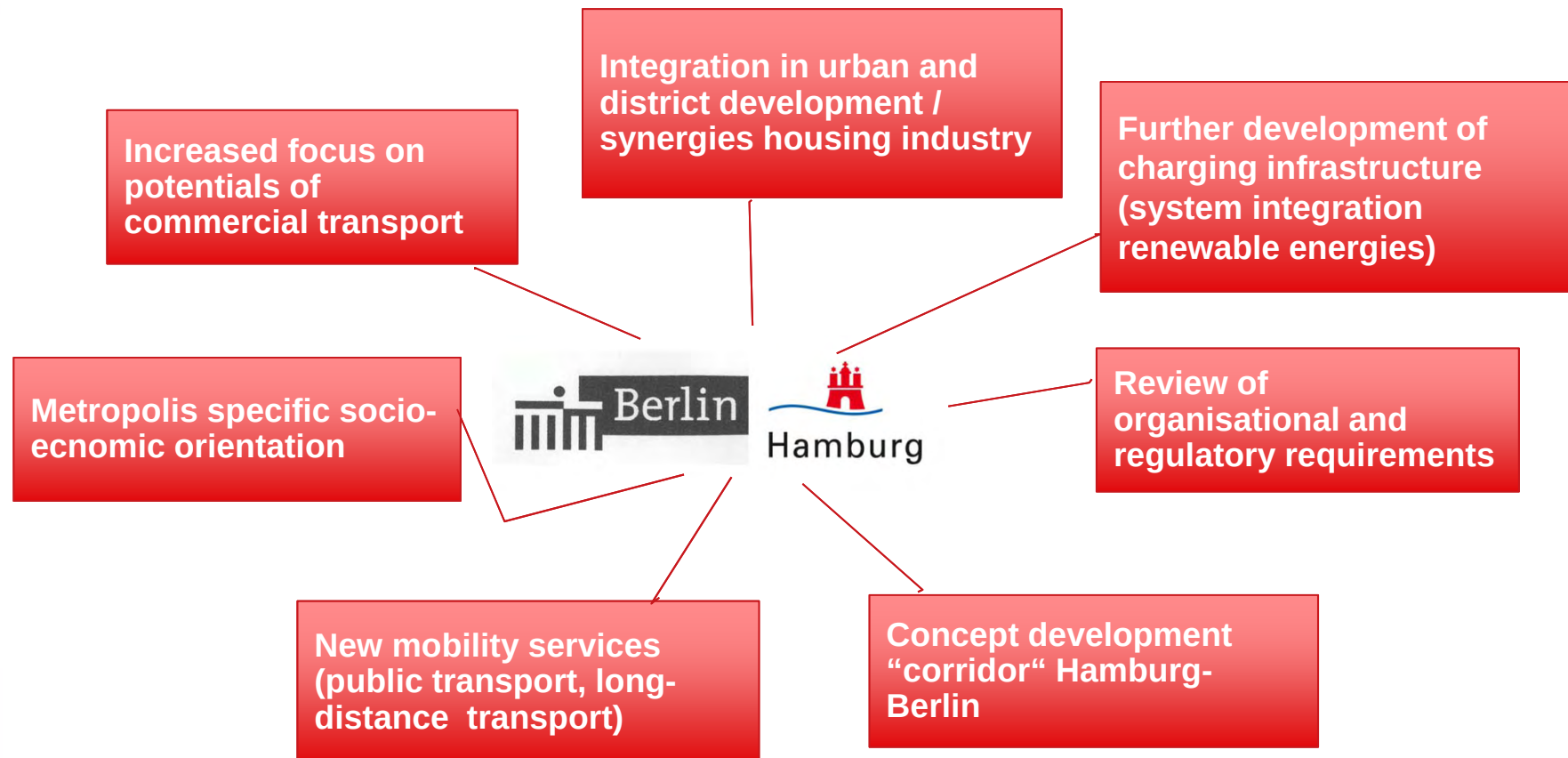
Main parameters

- Existing prior experience concerning fleet operation
- Consistent defined operation routine (comparability regarding frequency and kind of operation, consistent route characteristics)
- Minimum quantity regarding the extent of vehicle operation
 - weekday kilometre achievement > 50 km or
 - weekday run time > 3 hours
- Sufficient potential of durability (charging process) by night and day
- User compliance for frequent evaluation
- User willingness to accept clearly raised financial terms

Prospects of working with fleet customers

- Commercial transport and fleets in focus,
- Regulatory effects (environmental zones, etc.)
- Continuous involvement of electric vehicles in the existing cluster orientation (logistics, aviation and port)
- Provision of a significantly higher number of electric vehicles in fleets with greater delivery capacity
- Extensive changes of delivery relationships in particular urban areas to electrical drives (taking into account the customer relationships of each company)
- More active participation of fleet customers (knowledge from practice) regarding the interfaces between vehicle and charging infrastructure

The Hamburg-Berlin partnership is based on mutual interests





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