hy SOLUTIONS
Driving Innovation for Hamburg



elektro mobilität
Hamburg fährt mit grünem Strom.

Fuel Cells and electric cars - Hamburg's approach to green mobility

Peter Lindlahr
Managing Director, hySOLUTIONS GmbH
Coordination Centre for e-mobility

About hySOLUTIONS...

Founded:	2005
Associates:	Hamburger Hochbahn AG, Vattenfall Europe, Germanischer Lloyd, Handwerkskammer Hamburg, Handelskammer Hamburg
Business purpose:	Promotion of hydrogen and fuel cell activities in Hamburg Since 2009: Promotion of electric drive systems
Projects:	more than 20 projects (national and international)
Networks:	Founder of member of regional, national and European boards

Comprehensive 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!
- Wide range of existing Hydrogen and Fuel Cell applications in Hamburg









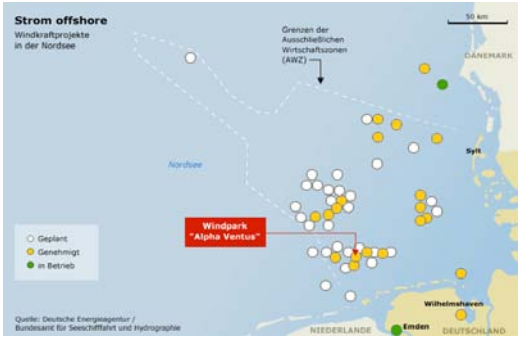
Memorandum of Understanding
between Hamburg Senate and Daimler, Shell, Total, Vattenfall:

> Up to 500 Daimler Fuel Cell Cars in Hamburg by 2015 (20 in 2011)

> Construction of five hydrogen refuelling stations

Wind energy: Source of clean power

- Actual capacity of windfarms = 20 GW (mostly onshore) in Northern Germany
- Another 25 GW currently under planning (mostly offshore until 2030)
- Official study shows that by 2020 the losses in peak load due to insufficient grid will be 4 TWh p.a. (up to 900 M Nm³ hydrogen, Hamburg heavy industries demands 320 M Nm³ hydrogen p.a.)
- Research project for wind-hydrogen network in preparati
-



Model regions for electric mobility

- Hamburg is one of eight German model regions
- Funding volume in total EUR 115 m., follow-up period until 2016 is currently discussed
- Aim is the on-road test of mobility concepts, vehicles, technical components and technical interfaces
- No competition of electric vehicles and public transport
- Main objectives:
  - demonstrating technical feasibility
  - identifying barriers
  - implementing innovative solutions
  - creating local added value
  - launching first business models

8 model regions

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

Modellregion Elektromobilität Hamburg

Project overview

hy SOLUTIONS Driving Innovation for Hamburg

Model Region Electric Mobility Hamburg

Diesel-hybrid buses	hh = more	Hamburg PURE	Hh = wise
Operation of DHB in regular passenger service Start of frequent procurement	Operation of cars in fleets Installation of public charging infrastructure	Operation of cars by commercial users (fleet operators)	Operation of cars in commercial traffic: craft, trade, logistics and port management
5 EvoBus Citaro Diesel-hybrid buses	50 Smart ED (since 11/2010), 18 Mercedes A-Class E-Cell 100 public charging points, 50 % civic operated	15 Renault Kangoo ZE (since 05/2011)	20 Fiat E-Fiorino (since 04/2011) 200 Fiat e500 & Ford eKa 15 Ducato electric (from 10/2011)
Filling stations on the depots of HOCHBAHN	100 % green power, “discrimination-free” charging infrastructure, in line with cityscape, regulatory issues regarding the establishment and operation of the charging infrastructure		

HOCHBAHN EvoBus FFG HAMBURG

hamburg.de HVV DAIMLER DB VATTENFALL HOCHBAHN HAMBURG ENERGIE hy SOLUTIONS SIXT

RENAULT hy SOLUTIONS Innovative Antriebe für Hamburg

KARABAG hamburg.de hy SOLUTIONS Logistik-Initiative Hamburg Handwerkskammer Hamburg HK Handelskammer Hamburg HPA Hamburg Port Authority

Current Status

- 133 BEV are currently in daily fleet operation
- Five Diesel-Hybrid buses in operation with a scope of some 60.000 Km
- Until end of this year additional 215 BEV will be available for commercial fleets
- Carsharing (6 Smart electric drive) offered by Deutsche Bahn
- 25 electric cars in municipal fleets (state departments, institutes, municipal companies)





Fleet customers

Airbus, Aurubis, Axel-Springer-Verlag, Baugenossenschaft dhu, Baugenossenschaft Hamburger Wohnen, Behörde für Stadtentwicklung und Umwelt, Beiersdorf, Buddenhagen, Budnikowsky, Carpe Solar, Deutsche Bahn/DB Rent, DPD, DS-Bauconcept, FFG Fahrzeugwerkstätten Falkenried, Finanzbehörde, Flughafen Hamburg, Globetrotter Ausrüstung, Golf Lounge, Hamburg Energie, Hamburg Port Authority, Hamburg Wasser, Handelskammer Hamburg, Handwerkskammer Hamburg, Hermes Logistik, HHLA, Hillmann + Ploog, HOCHBAHN, Hotel St. Raphael, IBV Immobilien Beteiligungs- und Vertriebsgesellschaft, internationale gartenschau Hamburg 2013 GmbH, Imtech, INFO Ges. f. Informationssysteme, Innung des Kfz-Handwerks, Institut für Umwelt und Hygiene, Itzehoer Versicherungen, KRAVAG-Logistic Versicherungen, Landesbetrieb Straßen, Brücken und Gewässer, Lesezirkel Leserkreis Daheim, Lombardium, Morgenpost Verlag, m+p consulting, NABU LV Hamburg, Panasonic Industrial Europe, Peterson-Hansen Familienrestaurant, Radsport von Hacht, REpower Systems, Sovereign Speed, Stadtreinigung Hamburg, STARCAR, Tchibo, Taylor Wessing Rechtsanwälte, TÜV Nord, TÜV Rheinland, Unilever, Universitätsklinikum Eppendorf, Vattenfall Europe, Verkehrsbetriebe Hamburg-Holstein/Pinneberger Verkehrsgesellschaft Unternehmensgruppe, Wohnungsgenossenschaft von 1904

Allocation of charging stations

HAMBURG

Das Netz für Hamburgs Autos

Elektromobilität als Motor der Zukunft – Stadt will weitere 370 E-Autos anschaffen

ZWISCHENRUF

Zurück in die Zukunft

100 charging points on public space (streets) and on Park-and-Ride-Facilities are implemented and in operation

Requirements:

- Charging power is 100% green power from renewable sources
- "discrimination-free" use of charging infrastructure (all energy providers accepted)
- Charging stations have to be in line with cityscape

Corporate charging infrastructure

wallboxes all linked to backend

„delayed charging" helps balancing the grid

→ more renewables in the grid

80 charging points on corporate ground

> predictable charging patters

> lower costs

> innovative charging modes

The fleet approach

User concept

- 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

Assessment criteria for the allocation of charging stations

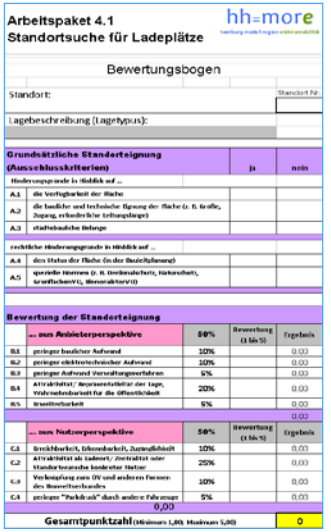
Basic site suitability (exclusion criteria)

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”).


Arbeitspaket 4.1
Standortsuche für Ladeplätze

hh=more

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	städtebauliche Belange		
rechtliche Hinderungsgründe in Hinblick auf ...			
A.4	den Status der Fläche (in der Bauleitplanung)		
A.5	spezielle Normen (z. B. Denkmalschutz, Naturschutz, Grundbuchrecht), Akteursebene)		

Bewertung der Standorteignung				
	... aus Anbieterperspektive	50%	Bewertung (1 bis 5)	Ergebnis
B.1	geringer baulicher Aufwand	10%		0,00
B.2	geringer elektrotechnischer Aufwand	10%		0,00
B.3	geringer Aufwand Verwaltungsverfahren	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 (1 bis 5)	Ergebnis
C.1	Erreichbarkeit, Erkennbarkeit, Zugänglichkeit	10%		0,00
C.2	Attraktivität als Ladeort/ Zwischenstopp oder Standortbezogene bedeutet 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

Evaluation of the site suitability

From provider perspective:

- attractiveness / representativeness of the locations, 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.

Focus

- Commercial transport and fleets in focus
- Regulatory effects (environmental zones, etc.)
- Further development of the charging infrastructure (fast charging, inductive charging)
- Spatial and social cluster
- Expectation management vs. actual market intersection (geographic, temporal)
- Continuous involvement of electric vehicles in the existing cluster patterns (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 participation of fleet customers (knowledge from practice) regarding the interfaces between vehicle and charging infrastructure

hySOLUTIONS GmbH
Peter Lindlahr (Managing Director)
Steinstraße 25
20095 Hamburg

+49 40 3288 4428

www.elektromobilitaethamburg.de

www.hysolutions-hamburg.de