B3. Incorporating innovation – How to plan for alternative fuel infrastructure

Masterplan fast charging infrastructure

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Overview

- Stuttgart Region, facts and figures
- Regional approach
- Road capability
- Masterplan fast-charging infrastructure
- Next steps
Stuttgart Region

Area
- 10%

Inhabitants
- 25%

GDP
- 30%

Baden-Württemberg

Stuttgart Region
Facts and figures

- Area: 3.654 km², 179 communities
- Inhabitants: 2.7 Mio.
- GDP: 124 billion Euro
- Population Density: 739 inhabitants / km²
- Employees: 1,0 Mio.
• Stuttgart Region....

  o ...is home of premium car-manufacturer and component supplier (Daimler, Porsche, Bosch...)
  o ...is one of four excellent cluster for electric mobility in Germany
  o ...offers a very high density in charging infrastructure, within 25 fast-charging column load (50 kW)
  o ...features the biggest electric car-sharing fleet worldwide (car2go, 400 eSmart, 100 B electric drive)
  o ...has been the location of the Electric Vehicle Symposium (EVS), in October 2017 in Stuttgart
  o ...provides a bike sharing system with one-way functionality with some 600 bikes, 150 pedelecs
    at 130 stations
Regional approach

Some 900,000 commuters travel every day
75% of all employees

609,000 within the Stuttgart Region
183,000 in-commuter (coming from outside the region)
107,000 out-commuter (traveling in other regions)
Car population
## New Passenger Car Registrations (BEV)

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Source: European Automobile Manufactures Association (ACEA)
Road capability
Charging time needed to drive additional 200 km (BMW i3)

DC (fast charging, 50 kW +): 15-20 minutes
AC (11 KW): 80 minutes

Government funding
BEV 4.000 Euro (BEV) or plug-in Hybrid 3.000 Euro,
but less cars being able for fast charging (50 kW +): 35.000 requests (BEV)

Some people are not used to plan their routes upon column loads
→ Increasing road capability
Stuttgart Region wants to enlarge their role as one of the leading locations for eMobility worldwide.

Simultaneously with the market penetration of BEV being able to fast-charging and the development of higher energy densities of the batteries, the Stuttgart Region wants to establish a area-wide allocation of fast-charging infrastructure with at least four charging points on every charging station.
Due to the high density of universities, research and development the Stuttgart Region attracts high-skilled people all around the world.

As a result of the high spending capacity and wealth in the Stuttgart Region some 3,000 BEV are registered (some 7% of all BEV in Germany).
Masterplan fast charging infrastructure

What’s beyond?

• At the „point-of-sale“ a costumer has to decide buying whether a car with conventional impetus, a hybrid-car (or plug-in-hybrid) or a BEV.

• Trusting upon a dense network of fast-charging infrastructure with loading periods of 10-15 minutes, while reaching these infrastructures in 5 / 10 minutes (to be accepted), the customer will appreciate this.
First approach: Reachability

As background for defining locations there are

- Simulation of the traffic demand with BEV
- Market penetration of BEV
- Deduction of fast-charging infrastructure
- Number of loading processes and energy amount sold to the BEV-owners
- Modelling the demand and the time to wait before charging

As a result the masterplan offers a tool for communities and private investors to define and localize fast-charging infrastructure with a connection power of 50 KW and more.
What to be consider?

• The tool considers the main facts and figures, like
  - number and location of existing (fast-) charging infrastructure
  - number of BEV in the Stuttgart Region
  - daily travels routes of employees, students / traffic volume
  - economic issues
  - points-of-interest
  - integration into the grid
  - determined expenditures of time to reach infrastructures
Reachability within 10 minutes

- Fast-charging infrastructure (58 locations)
- Restricted area (e.g. floodwater)
Fast charging in the Stuttgart region
Second approach: traffic, routes and POI

Daily routes (Monday to Friday) in the Stuttgart Region, to present the main routes of originating / terminating traffic
Traffic Volume on the Road Network

Legend
- Traffic Volume (veh/day)
- Up to 20000
- 60000 - 80000
- 100000 - 170000
- 20000 - 40000
- 80000 - 100000
- Road Network
- State Capital Stuttgart

Explanation:
Average traffic volume on the road network
Region Stuttgart at communal ("Gemeinde") level
in Stuttgart "Mitteibereich" level 2 (17)
Spatial Distribution of POIs

Legend
POIs
- Transportation (Bus and Train Stations, Airports)
- Commerce
- Exhibition, Congress and Cultural Facilities
- Hotel/Restaurant
- Trade/Industry
- Public Facilities
- Medical Facilities
- Education
- Sport, Recreation
- Parking

Explanation:
Spatial distribution of POIs by classes in the Stuttgart "Mittelbereich" level 2 (17)
Next steps

Sensitization of communities and private investors to build up new or to upgrade infrastructures (50 kW plus X)

Workshop for communities, to participate into the federal program

Exchange and support of energy suppliers, hotels....looking for excellent locations with access to medium voltage
Thank you!

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