Dr.-Ing. Walter Vogt

Integration of e-mobility activities in a multimodal mobility strategy at the local level: The example of Stuttgart

International Expert Conference & 3rd ELMOS* All-partner meeting

*) ELMOS … Introducing electric mobility as intermodal transport mean in small and medium sized cities in the South Baltic Area
Integration of e-mobility activities in a multimodal mobility strategy at the local level: the example of Stuttgart

(1) Understanding the e-mobility background of Stuttgart
(2) Stuttgart as a living lab: e-mobility programs, projects & measures
(3) The conceptual part: Integration of the activities in a multimodal strategy
(4) Conclusions
Stuttgart: Spatial pattern and administration units: some basic statistics

- **Municipality of Stuttgart**, capital of Baden-Württemberg, state of the south-west of Germany
- **Stuttgart region** (= „agglomeration“)
- **Metropolitan region of Stuttgart** („cooperation“)

<table>
<thead>
<tr>
<th></th>
<th>population (inhabitants)</th>
<th>area (km²)</th>
<th>density (inh./km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metropolitan region of Stuttgart</td>
<td>5,300,000</td>
<td>15,400</td>
<td>343</td>
</tr>
<tr>
<td>Stuttgart region</td>
<td>2,700,000</td>
<td>3,700</td>
<td>708</td>
</tr>
<tr>
<td>Municipality of Stuttgart</td>
<td>600,000</td>
<td>207</td>
<td>2,850</td>
</tr>
</tbody>
</table>

E-mobility „meets“ different authorities on different spatial levels with different responsibilities

Source: http://www.reutlingen.ihk.de/showMedia.php/5640, 17.08.2013

Population, area and density
Stuttgart: a wealthy region, worldwide known by automobile and automobile equipment companies
Stuttgart: polycentric agglomeration with complex O - D trip patterns – reason for traffic jams and automobile-induced emissions/ pollutions

Development of in- and outbound car traffic at the boundaries and the borders of the valley basin of the municipality of Stuttgart (1968 – 2012)

noise exposure in Stuttgart region (red color = 60-65 dB)
Metropolitan region Stuttgart: Same worldwide known companies, medium-sized enterprises as well as small innovative start-ups also produce pedelecs, e-bikes and bike equipment.
Urban Micro E-Mobility

The trend to local emission-free e-mobility in cities is evident. E-cars, E-bikes and E-scooter have **space advantages in narrow urban spaces**. They preserve valuable resources and, with regard to **rental systems or sharing concepts**, everywhere they are comfortably to rent by use of a **smartphone**.

Vision of a big European city 2030

Source: Daimler AG (Hrsg.): Technicity 1/2013
Development of e-car fleet and e-bike fleet in Germany (2001 – 2013)

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German national plan e-mobility, 1st phase (2009 – 2011): 8 test regions in Germany with different fields of e-mobility activities

E-mobility test regions and European metropolitan regions in Germany

Source: Fraunhofer IAO (ed): Strategies of cities in terms of e-mobility

German National Plan e-mobility

First phase (2009 – 2011)
„preparation of Introduction of e-vehicles on the market“

Second phase (2011 – 2016)
„successful market launch“

Third phase (2017 – 2020)
„volume market for e-vehicles“
(1 million e-vehicles/ e-cars)

Objective:
Germany as international market leader of e-mobility
National Program „Showcase E-mobility“ in Germany (2012-2015)

Objective: visibility of e-mobility for everybody

Competition: As a result of a competition 4 regional showcases (Baden-Württemberg, Berlin-Brandenburg, Niedersachen, Bayern/Sachsen) have been elected to develop and present large-scale pilot-schemes of e-mobility in Germany

Baden-Württemberg: Showcase Living Lab „BW e mobil“:
more than 40 e-mobility projects (in 9 categories) with more than 100 partners: most projects in the metropolitan region of Stuttgart

(1) Education and Qualification
(2) Energy, Infrastructure and ICT
(3) Automotive Engineering
(4) Fleets and Commercial Traffic
(5) Intermodality
(6) Communication and Participation
(7) Cross-project Research
(8) Urban and Transportation Planning
(9) Living and e-mobility

9 project categories
Showcase „Livinglab BW e mobil“: Project categories (4) and (5)

(4) Fleets and Commercial Traffic

(4.1) e-fleet-airport Stuttgart (6 different e-vehicles used for aircraft handling)
(4.2) Get eReady (large-scale pilote-scheme to analyse the potentials of e-mobility using vehicle-fleet of diverse e-cars, in total 750 hybrid and electric vehicles within the region of Stuttgart)
(4.3) e-vehicle-fleet of the state of Baden-Württemberg
(4.4) Rheinmobil: Are e-cars more economic than conventional cars?
(4.5) Environment-friendly municipal vehicles (e.g. street cleaning)
(4.6) Urban logistic commercial traffic (parcel deliveries of DHL, DPD and UPS using e-vehicles)

(5) Intermodality

(5.1) E-2-Bike mobility connection & access at train stations
(5.2) e-Call a Bike and e-Flinkster in Stuttgart
(5.3) GuEST-cooperation project to analyse the use of e-taxis in Stuttgart (bank business model, acceptance of taxi drivers and customers etc.)
(5.4) HyLine-S (operation of a hybrid busline in Stuttgart; charging analysis)
(5.5) Stuttgart Services (easy access to e-mobility for all inhabitants of Stuttgart region)
Network E-2-Bike

Creating a sustainable connection mobility operating day and night (without car or bus) by building-up pedelec rental stations at 14 train stations of the region. Commuters and rail travelers can continue their trips e.g. for the last mile to home by pedelec. Pedelecs can be returned at other stations (one-way tours) what makes it interesting for tourists as well. The system will operate with the VVS mobilpass. Additional storage space for private pedelecs is foreseen.

Fellbach train station – fit for future

Reconstruction of Fellbach train station to a hub of innovative and sustainable mobility
- installation of public charge columns,
- mobility centre,
- pedelec rental station,
- bike parking lot with 150 parking positions

Measures shall contribute to a more comfortable mobility without car.

Planned Pedelec & Bike stations at 14 train stations within Stuttgart region: mobility hub at Fellbach train station
Source: Dornier Consulting Updates, 2012; Stuttgarter Zeitung vom 2.03.2013
Intermodality: e Call a Bike – public bike rental system with pedelecs and normal bicycles in Stuttgarts` hilly surroundings (1)
Intermodality: e Call a Bike - public bike rental system with pedelecs and normal bicycles in Stuttgarts` hilly surroundings
Stuttgart: Public bike rental system „e Call a Bike“

<table>
<thead>
<tr>
<th>Opening</th>
<th>2007/ 2011</th>
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<tbody>
<tr>
<td>Number of bikes</td>
<td>400</td>
</tr>
<tr>
<td>Number of pedelecs</td>
<td>60 (100)</td>
</tr>
<tr>
<td>Number of stations</td>
<td>45 (65)</td>
</tr>
<tr>
<td>Mean Distance between stations</td>
<td>0,6 km</td>
</tr>
<tr>
<td>Station Density</td>
<td>4,0 per km²</td>
</tr>
<tr>
<td>Fare (&lt;30 min)</td>
<td>0,0 € normal bike 0,12 €/ min pedelec</td>
</tr>
<tr>
<td>Rentings per day, best month</td>
<td>about 400</td>
</tr>
<tr>
<td>Rentings per bike/day best month - average month</td>
<td>3,6 – 2,4</td>
</tr>
<tr>
<td>Share Shifting from car</td>
<td>3 %</td>
</tr>
</tbody>
</table>

Stuttgart region as „pilot region for sustainable mobility“
(„Modellregion für nachhaltige Mobilität“)

The „Region Stuttgart“ association

… is responsible for **regional planning of PT**

… plays a major role in bringing together **key players & stakeholders** of municipalities, companies, associations and organisations to develop common solutions in activity fields like

- **intermodality/ multimodality/ e-mobility**
- ICT-applications in mobility (e.g. mobility apps, e-ticketing via smartphone ect.)

… is the leading organisational unit of (at the moment) **12 innovative mobility projects** (implementation (2012-2015) of the regional grant program „pilot region for sustainable mobility“ with an amount of 3.6 million Euros of the total costs of 10.5 million Euros)
Multimodal mobility ticket: VVS* mobilpass (flyer)

Development of a multimodal mobility-ticket (VVS Mobilpass) which combines PT-tickets with further mobility offers like (e-) Call a Bike, (e-)car2go and (e-)Flinkster. The mobilpass is available for all customers of the region and will be part of the Stuttgart Services Card.
Stuttgart region as „pilot region for sustainable mobility“:
Some projects

Waiblingen E-mobil

- E-mobility offers for private and professional use; e-car sharing with renewable energy; staff e-cars; mobility centre and Internet platform; evaluation of acceptance, attitudes and behaviour of households, companies and pedestrians.

Sustainable mobility and living in Stuttgart-Fasanenhof

- In one of the outer quarters of the municipality of Stuttgart (built in the 1960's; renovated 2012/13) topics of mobility and housing shall be linked. In a housing project 3 e-cars and 5 to 8 pedelecs as well as charging infrastructure shall be available. Attitudes & behaviour of owners and tenants shall be checked. Test of user-friendly accounting systems. Response to the question if mobility sharing will make it possible to reduce the number of required parking positions referred to building regulations.

Mobility management for small companies in Ludwigsburg

- Provision of demand-oriented mobility offers for small companies; greater use of energy-efficient modes (ecomobility); installation of a mobility Internet portal
Stuttgart: Pedelec projects supported by municipality

A pedelec-race up the hills

„company“ pedelecs of the Stuttgart city administration
Stuttgart pedelec projects supported by municipality: City of Stuttgart e-mobility centre (2009-2012)

• For about 3 years visitors could get information about e-mobility in the e-mobility centre which - also supported by the EU project „Go Pedelec“ – was established downtown not far away from main station.

• In a showroom of about 1000 m² manufactures research institutes and other organisations presented the possibilities and chances of e-mobility. In and around the centre pedelecs could be tested.

• In context of workshops, round-table meetings etc. the showroom offered a platform for knowledge exchange of and with experts.

• Since end of Oct 2012 the showroom is closed only for a temporary use. City administration currently is checking a new solution: a kind of start-up centre in which start-ups can test innovative concepts and develop bank business models with regard to the suitability for daily use.
Objectives

Improving urban mobility by advancing or creating sustainable, energy-efficient urban transport systems in the participating European cities for the benefit of all citizens, society and climate policy, respecting the environment and natural resources.

Timeframe

December 2012 – November 2016

Total cost

9.1 M €; 5.8 M € funding of the CIVITAS Plus II Program

23 measures in 4 cities

Source: Wolfgang Forderer. LH Stuttgart
Stuttgart Measure: Bringing E-Mobility into the daily life of citizens

- Campaign for public awareness:
  - Information, discussion and training on district level
    - Information events on technology with a mobile power drive
    - Information on e-mobility in the neighbourhood (charging facilities for cars and pedelecs, car and bike sharing services and locations etc.)
  - Vehicles for testing

Source: Wolfgang Forderer, LH Stuttgart
Stuttgart Measure: Bringing E-Mobility into the daily life of citizens

- **Trainings for special target groups:**
  - For **school classes**: Mobile e-mobility lab created by Technische Akademie Schwäbisch Gmünd
  - For **elderly**: Trainings and guided tours with pedelecs for elderly people in cooperation with “treffpunkt senior”
  - For **members of youth parliament**: Test tracks and information events
  - For **relief emergency staff** (Red Cross, THW): E-Learning tool about the correct behavior at incidents or accidents with e-vehicles

Source: Wolfgang Forderer, LH Stuttgart
Stuttgart Measure: Bringing E-Mobility into the daily life of citizens

- **Integration of e-mobility in urban planning**
  - Technological, administrative and political process for the implementation of a comprehensive network of charging facilities for two and four wheelers.
  - Inclusion of the requirements for e-mobility (parking, charging etc.) in an early stage of constructions. Binding contracts with investors.

Source: Wolfgang Forderer, LH Stuttgart
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Transport Development Concept Stuttgart 2030 – interdependencies

Interdependencies between different sectoral plannings

Source: LH Stuttgart (ed.): VEK Stuttgart. Stuttgart 2010
Planning at the local level (Stuttgart): Objectives & measures in different local plans & concepts (1)

- **Coordinated** development of settlement & transport structure
- Development of public transport (PT), car traffic, bicycle and pedestrian traffic as integrated system
- Upgrading PT with highest priority
- Managing car traffic and bundling car traffic in axes

- Strategic guidelines and practical measures to improve PT, esp. attractive site development by PT

- **(Car) Traffic reduction** (integrated urban & transportation planning)
- **Shift to PT and non-motorised traffic** (ecomobility) (mobility management)
- Local management of the remaining „inevitable“ car traffic to minimise the impacts (traffic management)

Regional Transportation Plan (Scenario „Stuttgart region – fit for future“) (2001 – 2010/15)


Land-use plan (2010)
Planning at the local level (Stuttgart): Objectives & measures in different local plans & concepts (1)

- Reduction of vehicle-km travelled of cars with combustion engine (e.g. shift to e-mobile vehicles)
- Improvement of traffic flow towards a more efficient energy use (e.g. less congestion, speed limit)
- Vehicle related measures for lower energy consumption (e.g. low consumption car)
- Reduction of dust pollution
- Reduction of NO2 emissions
- Reduction of traffic noise (main source is motorised traffic)
- Location/ allocation, type & degree of buildings and land use have to be coordinated with transportation network, esp. PT
- Priority for eco-mobility (PT, non-motorised modes)

Climate protection concept (KLIKS) (updated version, 2007)
Clean air program (2009)
Noise abatement plan (2009)
Integrated urban and transportation planning
Transport Development Concept Stuttgart 2030
(draft version for public participation)  (october 2010)

„Transport Development Concept“ …

… framework for transportation planning of the municipality of Stuttgart for the next 20 years

… development of forward-looking strategies for mobility and transportation in all fields of urban transport

… integrated treatment and consideration of interdependencies with other relevant spatial concepts
Transport Development Concept Stuttgart 2030

➢ E-mobility as one of the cross-sectional topics …

3. Integrated planning – setting a platform for urban mobility

3.1 The traffic development concept as part of the total planning system
3.2 Integrated urban and transportation planning
3.3 Design of urban space
3.4 Social sustainability of urban and transportation planning
3.5 Traffic safety
3.6 E-mobility
3.7 Traffic and environment
Chapter 3.6 E-mobility

- Stuttgart „welcomes energy-efficient and environmental-friendly drive technologies and actively promotes e-mobility“

- Chances and overestimation of e-mobility

- Clarification of infrastructural needs of e-mobility
  - priority for charging infrastructure on private ground
  - scepticism towards charging stations in public space
  → recommendation to award an expertise and to develop a concept to clarify legal and organisational issues

- Options for promoting e-mobility
  - priorities for parking of environmental-friendly cars in public space legally possible??
  - other exceptions possible??

- measures: e-mobility centre as showroom of e-mobile solutions, public bike rental system e Call a Bike, implementation of e-fleet systems e.g. taxis (concept development)
Action Plan „Sustainably mobile in Stuttgart“ (July 2013)

(„Nachhaltig mobil in Stuttgart“, Gemeinsamer Aktionsplan des Lenkungskreises Mobilität unter Leitung von Oberbürgermeister Fritz Kuhn)

Higher living quality in the state capital Stuttgart

- Less emissions
- Less noise
- Less congestion
- Less stress

Fields of action

Action field 1: Intermodality and interconnection
Action field 2: Public Transport
Action field 3: Commuter traffic
Action field 4: Municipality related mobility
Action field 5: Mobility in the region
Action field 6: Car traffic
Action field 7: Non-motorised traffic
Action field 8: Commercial traffic
Action field 9: Public relations

Objective: „Reduction of 20 % conventional car traffic within city centre!“
Action Plan „Sustainably mobile in Stuttgart“ : measures (extract) (1)

Action field 1 „Intermodality and interconnection“

- **Multimodal and integrated traffic management**
  - Upgrading of an integrated traffic management centre
  - Traffic monitoring (e.g. parking control)
  - Roadworks and incidence management

- **Introduction of the Stuttgart Service Card**
  - Link of the electronic PT-Ticket to intermodal mobility services (e.g. (e-)car- and bike-sharing)
  - Access to further municipal services (e.g. baths, libraries) and implementation of optional payment and bonus functions to facilitate PT- use (current non-users shall own the access to ecomobility (bike, PT, carsharing etc.))
  - Organisation of an intermodal information and booking platform with regard to a standardized and comfortable access to intermodal mobility for all customers

- **Provision of parking space for car sharing vehicles**

- **Advancement of mobility information services (esp. mobility information packages for new citizens or for companies)**

- **Creation of a citizens` forum for all kinds of mobility**
Integration of Action Plan and Traffic Development concept 2030

Next steps

- Adoption of the action plan by local council
- Check if „Traffic Development Concept Stuttgart 2030“ (draft version 2010) is still compatible with the actual local politics → where required Transportation Development Concept will be adapted, also with regard to the content of the foreseen biennial budget which is currently handled
- Integration of action plan and Traffic Development Concept Stuttgart 2030
  (The action plan in form may be an additional annex but its essential content and statements have to be integrated into the TDC)
- Resolution of the municipal council
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Conclusions

- E-mobility, based on use of renewable energy, may have a lot of advantages.

- But: E-mobility in kind of e-cars will **not reduce the problems of car traffic in cities in general.**

- **Existing guiding principles** in urban and transportation planning like avoiding car traffic, shift of car traffic to ecomobility modes and social sustainable handling of „inevitable“ car traffic should **still have priority**.

- E-mobility is a **cross-sectional task of urban mobility and transportation planning**. **The interdependencies and interfaces with other urban and regional plans and concepts** as well as the **required consistency with existing guiding principles and objectives** however **need an integrated approach.**
Conclusions

SWOT- analysis of e-mobile city

Source: Fraunhofer IAO (ed): Strategies of cities in terms of e-mobility
A new handbook of an Austrian association (austriatech) “E-mobility in municipalities“ gives a relative consistent overview about the integration of e-mobility in the spatial and transportation planning of cities (unfortunately only in German language).

→ www.austriatech.at/news/aktuelles/gemeindehandbuch-e-mobilitaet-erschienen
GoPedelec… and smile!

Thank you!
Vision and strategy „Frankfurt e-mobil“

2.3. Development of marketing concept „Frankfurt e-mobil“

1.2: Open Charging- and Accounting system (Frankfurt pilot e-mobility)

4.2.: Pedelec sharing (Battery exchange system)

1.3: Enabling charging in inner-urban districts for residents (residential parking garages)

1.1: Identification of target groups for first market progress

2.1: Target group „teenagers & e-mobility“ = mobility of tomorrow

3.2. Standardization of charging technique

4.1: Conversion of municipal service car fleet into E-cars (2011-2020)

2.2. Development of tourism concept in terms of pedelecs/scooters

3.3. Establish legal frame conditions for e-mobility

1.4: Priority parking of car sharing e-cars in residential areas

4.4: Develop and start to convert city logistics concept on e-car basis

2.5: Offer a special „Frankfurt e-mobility“ award

1.6: Cross-linking of commuter trip chains (e-vehicle, P&R, PT)

Priorities of e-mobility in Frankfurt until 2025 (1)

Roadmap of e-mobile city

Source: Fraunhofer IAO (ed.): Strategies of cities in terms of e-mobility. Stuttgart 2012