Emission free on roads in Esslingen – Mobility as an integral part of concepts for climate-neutral urban districts

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Research Project „Es_West_P2G2P“

Consortium and Funding Bodies

6th Energy Research Programme of the Federal Government
Funding initiative: „Solares Bauen/ Energieeffiziente Stadt“
Duration: November 2017 – November 2022

Principal applicant
City Esslingen

Project coordinator
Steinbeis Innovation Center EGS Stuttgart

Research institutes
Building owner
Transportation companies
User interface
Energy suppliers

Other Partners:

Joint funding by:

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District - Neue Weststadt Esslingen

Location

- Esslingen ~ 93,000 inhabitants
- Location adjacent to the station
- Brownfield area
„Neue Weststadt“, Esslingen
Facts and Views

Area: Approx. 12 hectare (30 acre)

Building blocks:
- A: Building use not yet defined
- B: 132 Residential units, completion 2018
- C: 128 Residential units, completion 2019
- D: 200 Residential units, completion 2020
- E: Non-residential, completion until 2021
- University of Applied Sciences Esslingen
Motivation

From **Building** as power plant and filling station

to

**Climate-neutral urban districts**

Use of local and supra-regional renewable energy sources
Es_West_P2G2P
Research Focuses

- Climate neutrality
- Sector coupling
- Smart-Grid
- Power grid stabilization
- Power-to-Gas (H₂)
- Low-emission mobility
- Future filling station
- User integration

Figure: www.chemanager-online.com
Masterplan „Neue Weststadt“

Energy Supply

- University
- Energy center
- Blocks (A) + E + D
- Blocks B + C

- Gas grid
- Power grid

- Local heating network (A), D, E, HSE
- Technical center (A), B, C

- Electrolysis
- Fuel cell
- Grid injection Industry, Mobility

- University Energy center
- Blocks (A) + E + D
- Blocks B + C
Mobility
Private and Public Local Transport

Private Transport
- Future filling station
  - E-charging infrastructure
  - Hydrogen filling station
- E-Car- and E-Bike-Sharing
- Underground parking spaces with Wall Box

Electric hybrid buses
- Energy from overhead contact line or battery
- Charge while driving on the contact wire
- Pure battery operation in sections without overhead contact line

Figure: www.vorsprung-online.de
Figure: www.fnp.de
City Traffic Of The Future
Objectives of the Municipal Transport Companies

Objectives
• Replacement of combustion engine buses
• Expansion of overhead line network by 20 %
• Purchase of battery hybrid buses
• Quadrupling the electric driving distance

Environmental Aspects
• 79 tons of CO₂ savings per year and vehicle
• E-motors significantly less noise

Electricity supply of urban district
• Local electricity generation in the district (Photovoltaics, fuel cell, battery storage)
• Direct coupling via efficient DC-DC converters (Buses: 650 V DC)
Trolleybuses in Esslingen
A Long Story …

1944

1960-1969

1975

2016

2018

Figure: www.sve-es.de

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Figure: www.sve-es.de

Figure: www.obus-es.de

Figure: www.obus-es.de

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Figure: www.sve-es.de
Mobility
Public Transport - City traffic of the future

- Catenary, existing
- Driven battery route
- Catenary expansion
- Driven battery route (57 %)
- Additionally driven battery route (63 %)
User Interface

Digital User Interface for Private and Public Spaces

User Interface

- Informs about energy consumption
- Sensitizes for energy use
- CO₂- und energy balance
- Integration of additional services 
  e.g. Car-Sharing, Accounting

Augmented-Reality in public space

- Interactive guide through urban district
- Integration of public mobility (public transport)
- Mobile devices of users widely available
Key Components
Citizen Participation, Public Relation and Knowledge Transfer
Timetable And Outlook

Timetable:
• 2018/ 2019: Completion block B and C
• 2020: Commissioning electrolysis
• 2020: Acquisition of trolleybuses
• 2021: Completion „Crystal Rock“
• 2022: Completion new University

Outlook and vision:
• Measures for future climate protection already today
• Consumer-related renewable energy structure
• System coupling: local energy generation and mobility

More at the 10th German-Japanese Environmental and Energy Dialogue Forum
Thank you for your attention!