

trolley:2.0

for smart cities



- **Partner:**
 - trolley:motion, Austria (Coordinator), AT
 - Barnim Bus Company mbH & Technical University of Dresden, DE
 - Evopro Group, Szegedi Közlekedési Kft. & University of Szeged, HU
 - Technical University of Delft & Power Research Electronics BV, NL
 - University of Gdansk, PL
- **Duration:** 04/18 – 09/20 (30 months)
- **Budget:** €2.887.580 - Funding: €1.958.590

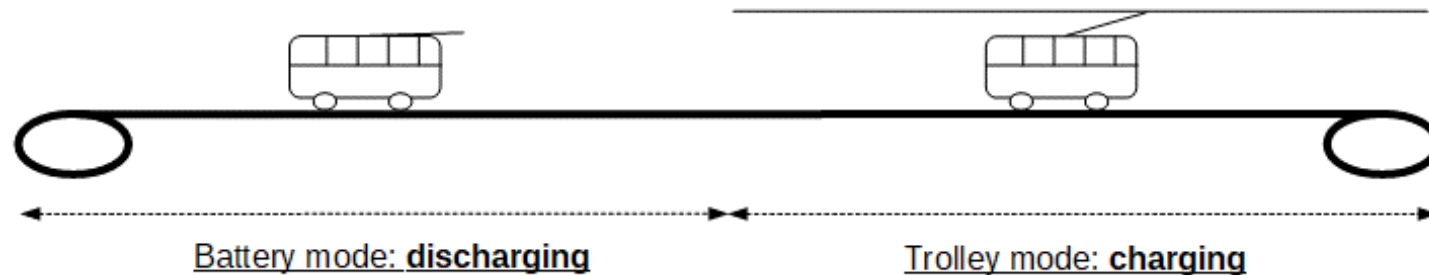
Main goals

TROLLEY 2.0 aims

- to improve the efficiency of public transport based on **battery supported trolleybuses**
- and to integrate **new electro mobility services** based on a **smart trolley grid** as backbone for charging solutions in a smart city.



New in-motion charging concepts: Eberswalde (regional), Szeged (feeder) & Gdynia (metropolitan)



Energy
consumption

Length of
off-wire distance

Discharging
efficiency

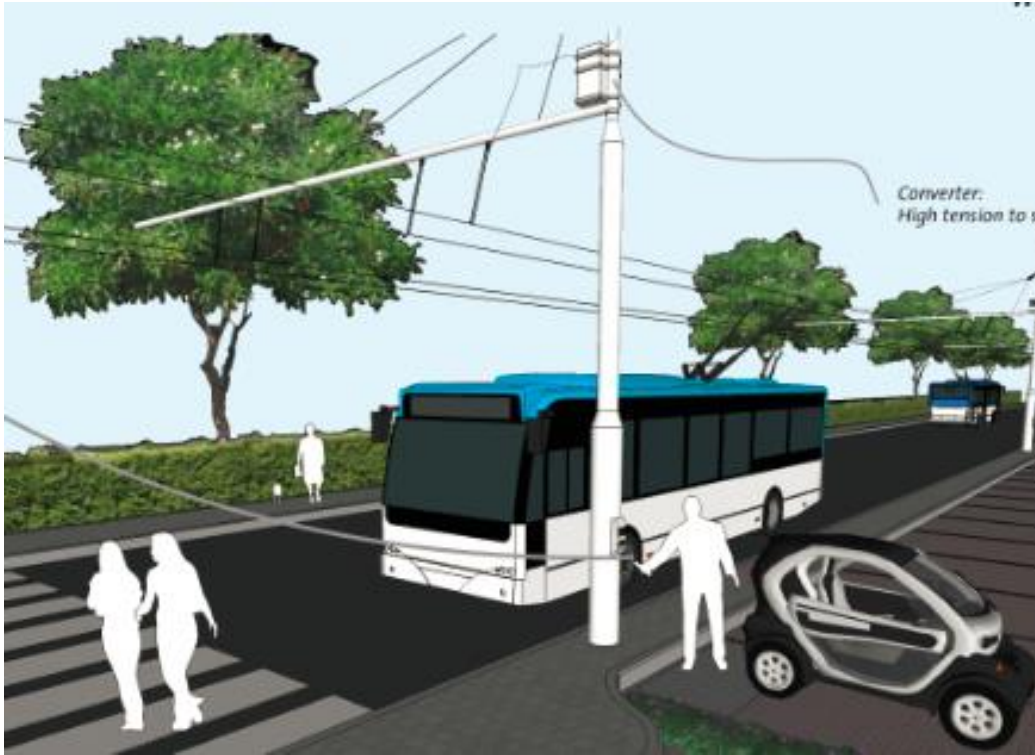
Charging
power

Time of ride
in wire mode

Charging
efficiency



Multi-purpose charging infrastructure: Arnhem, Eberswalde & Szeged



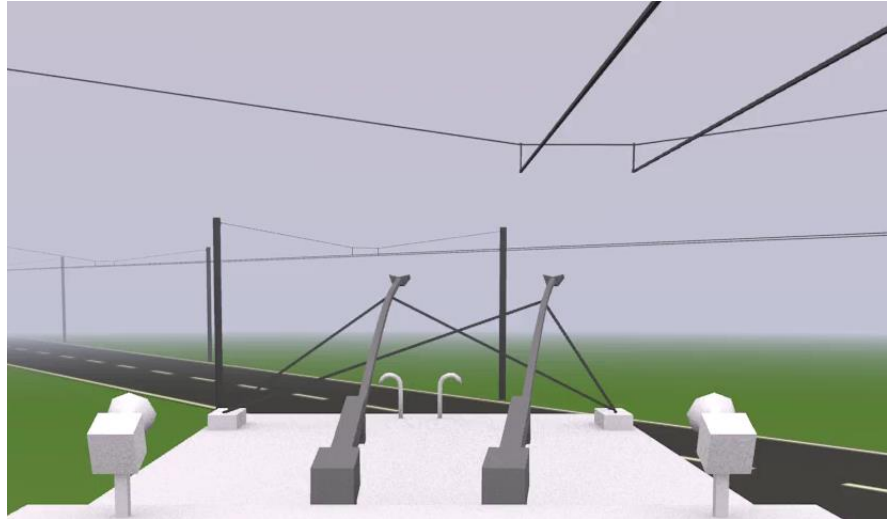
<http://www.omroepgelderland.nl/nieuws/2134955/Autorijd-en-op-energie-van-remmende-trolleybussen>



Prototypes & Innovations:



Conversion of an electric midi-bus into trolley-battery charging bus & testing of prototype bus in TROLLEY 2.0 partner cities (Evopro, all cities)

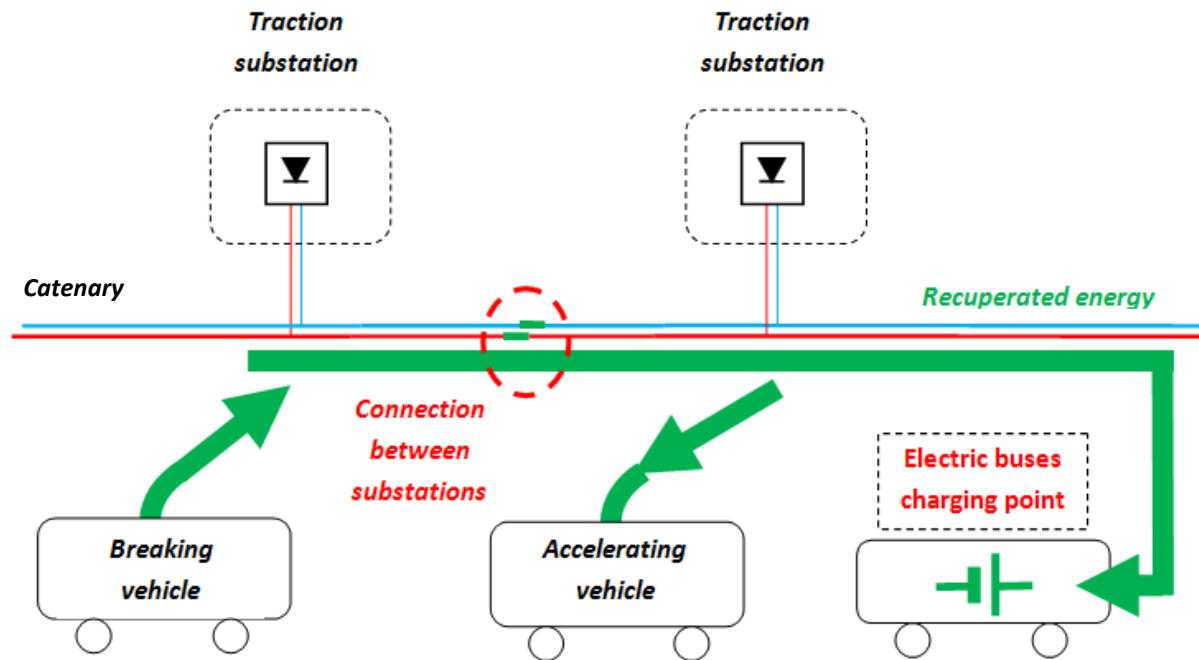


Testing of automated wiring technologies in TROLLEY 2.0 partner cities (Eberswalde, Szeged)



Testing of energy storage concepts integrated into trolley grid / substations (incl. 2nd life batteries) (TU Delft, PRE, Szeged)

Smart trolley grids:



Billateral energy supply & optimised usage of recuperation energy by balancing energy flow and levelling voltage drops (Gdynia)



Integration of RES into trolley grids (TU Delft, PRE, uni Gdansk/ Gdynia)

Networking and knowledge exchange with stakeholders: User Forum and Twinning Programme

- **Twinning arrangement with associated partners** to develop implementation scenarios & replication plans (Salzburg, AT; Solingen, DE; Arnhem, NL; Tychy, Lublin & Gdynia PL; Budapest, HU)
- **User Forum** to foster knowledge exchange (**workshops with 20-25 stakeholders & site visits**)

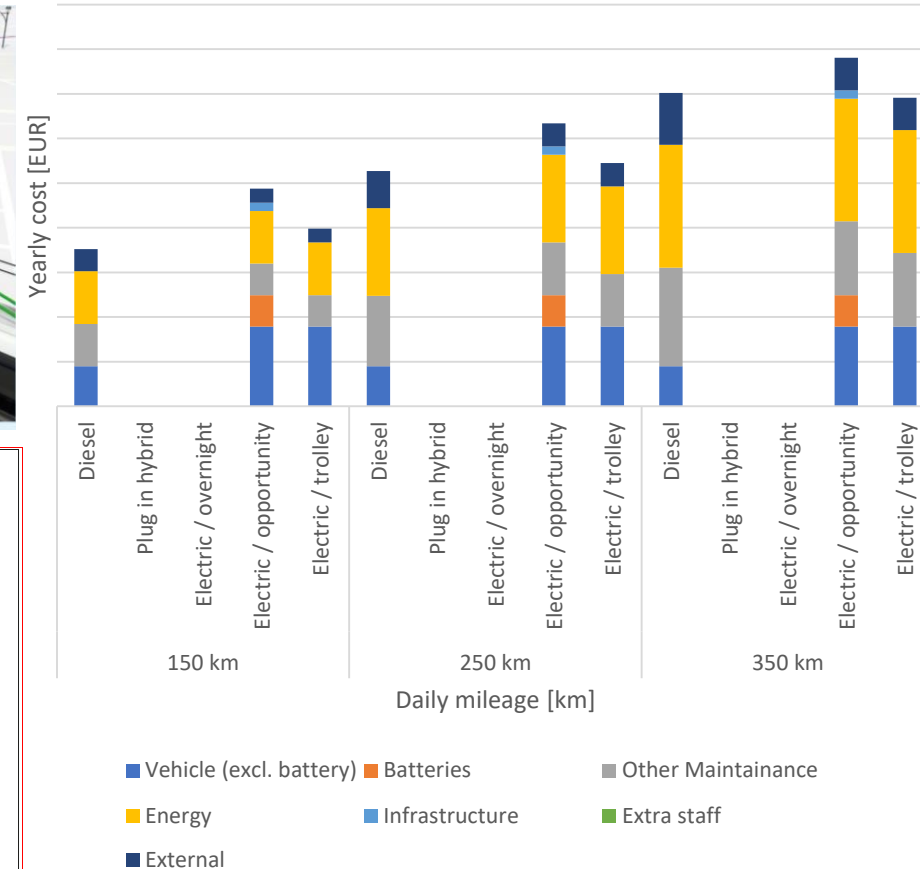


Trolley 2.0 User Forum Members

- Salzburg AG, AT
- Stadtwerke Klagenfurt, AT
- Stadtwerke Solingen, DE
- Budapest BKV, DE
- BVG Berlin, DE
- Stadtwerke Marburg, DE
- PKT Gdynia, PL
- MPK Lublin, PL
- TLT Tychy, PL
- Municipality of Arnhem, NL
- Hordaland County Council, (Bergen) NO
- PMDP Pilsen, CZ
- Maribor City Council, SI
- TPER Bologna, IT
- OSY Athens, GR

Exploitation and Dissemination: Tools, media & events

- Provide new knowledge on efficiency, regulation and conditions for market uptake:
 - **Tools** (CBA model, battery scalability for IMC, best-practice platform)
 - **Recommendations** on IMC implementation, regulatory frameworks, business case development
- **Synergies with ongoing initiatives/ projects and events:**
 - Clean Bus Deployment Initiative
 - ASSURED, new H2020 projects
 - TM, Busworld, UITP summit



Summary - key objectives

- **To improve the charging technology for trolleybuses based on in motion-charging** for extensions of trolley bus networks and replacement of diesel bus lines in remote sections
- **To develop demonstrators for multi-purpose charging infrastructure** - to investigate and demonstrate the potential of trolley grids to become urban DC backbones for the charging of e-vehicles (e-midi-buses as feeder system, e-cars & e-bikes)
- To integrate RES and energy management systems to develop **smart grid concepts for trolley networks**
- To develop a **new midi trolleybus prototype** (incl. automated wiring system), **scalable battery packs for trolleybuses** and to demonstrate stationary **energy storage systems** (incl. use of 2nd-life batteries)
- To develop **best practice examples, guidelines and policy recommendations** how to make trolley grids “smart”

Thank you for your attention!

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