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**

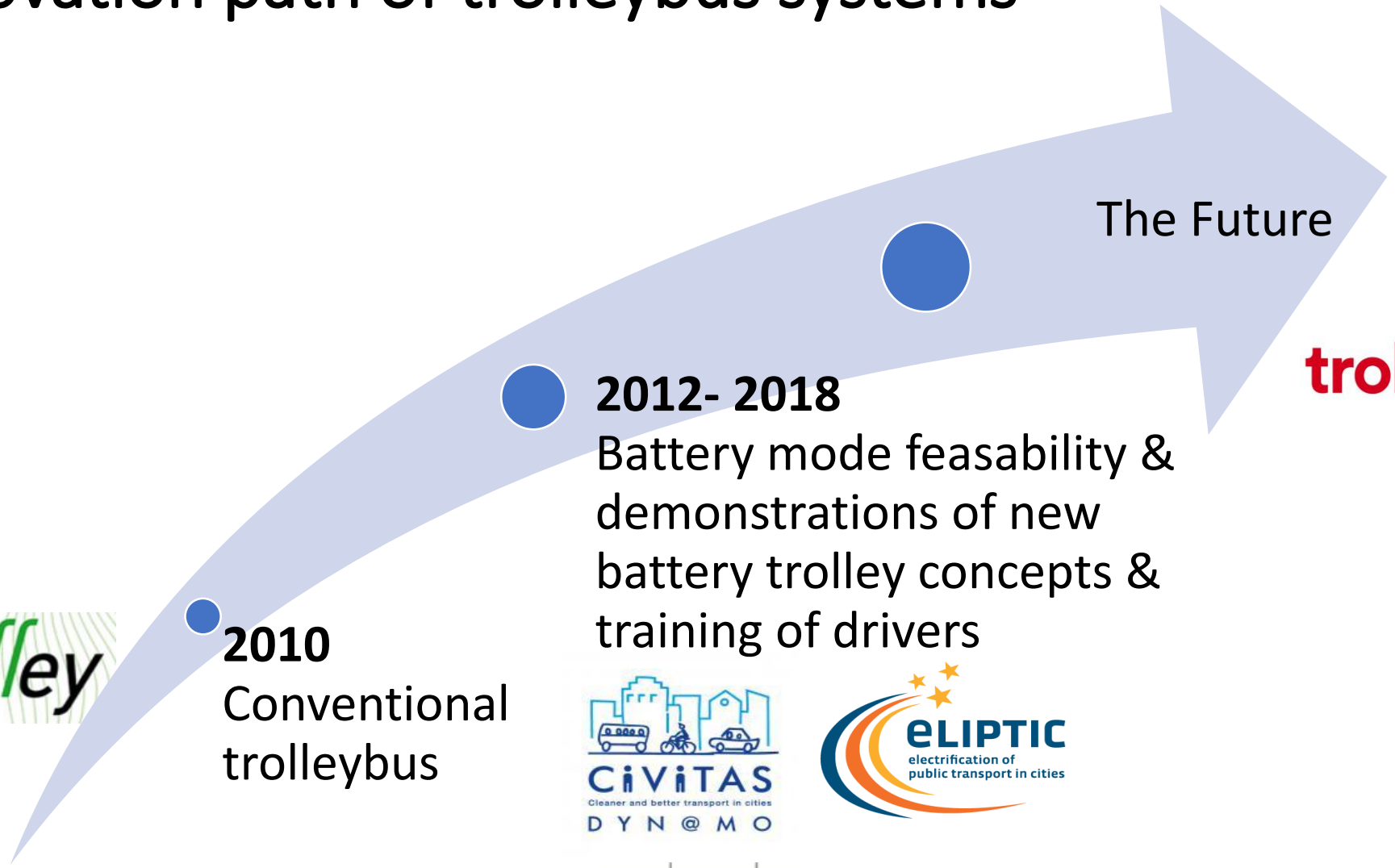
trolley:motion – our main tasks

trolley:motion
urban e-mobility

- Experience and knowledge exchange between networks of cities and businesses
- Information on sustainable urban mobility solutions, especially Trolleybus systems (several thousands of news entries on website, publications etc.)
- Organization of international conferences: Zurich in 2008, Lucerne 2010, Leipzig, 2012, Hamburg in 2014, Berlin 2016 and Solingen 2018; plus specific topic-related workshops
- Participation in (EU) research projects (including Actuate, ELIPTIC, TROLLEY 1.0 and 2.0
- Public relations and lobbying work for zero-emission bus systems; in particular trolleybus systems

LibroDuct
Furrer+Frey baut Fahrleitungen
HESS since 1882
RUPPRECHT CONSULT Forschung & Beratung GmbH
S2A CONSULTING
TSA Traktionssysteme Austria
Kummler+Matter
TÜV SÜD
Kruch Railway Innovations
VENEMA Venema Technisch Bedrijf B.V.
PRE power developers
IfB Institut für Bahntechnik GmbH
Elektroline

Our innovation path of trolleybus systems



trolley

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CiViTAS Cleaner and better transport in cities DYNAMO

eLIPTIC electrification of public transport in cities

actuate

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Electric Mobility Europe

European Commission

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.

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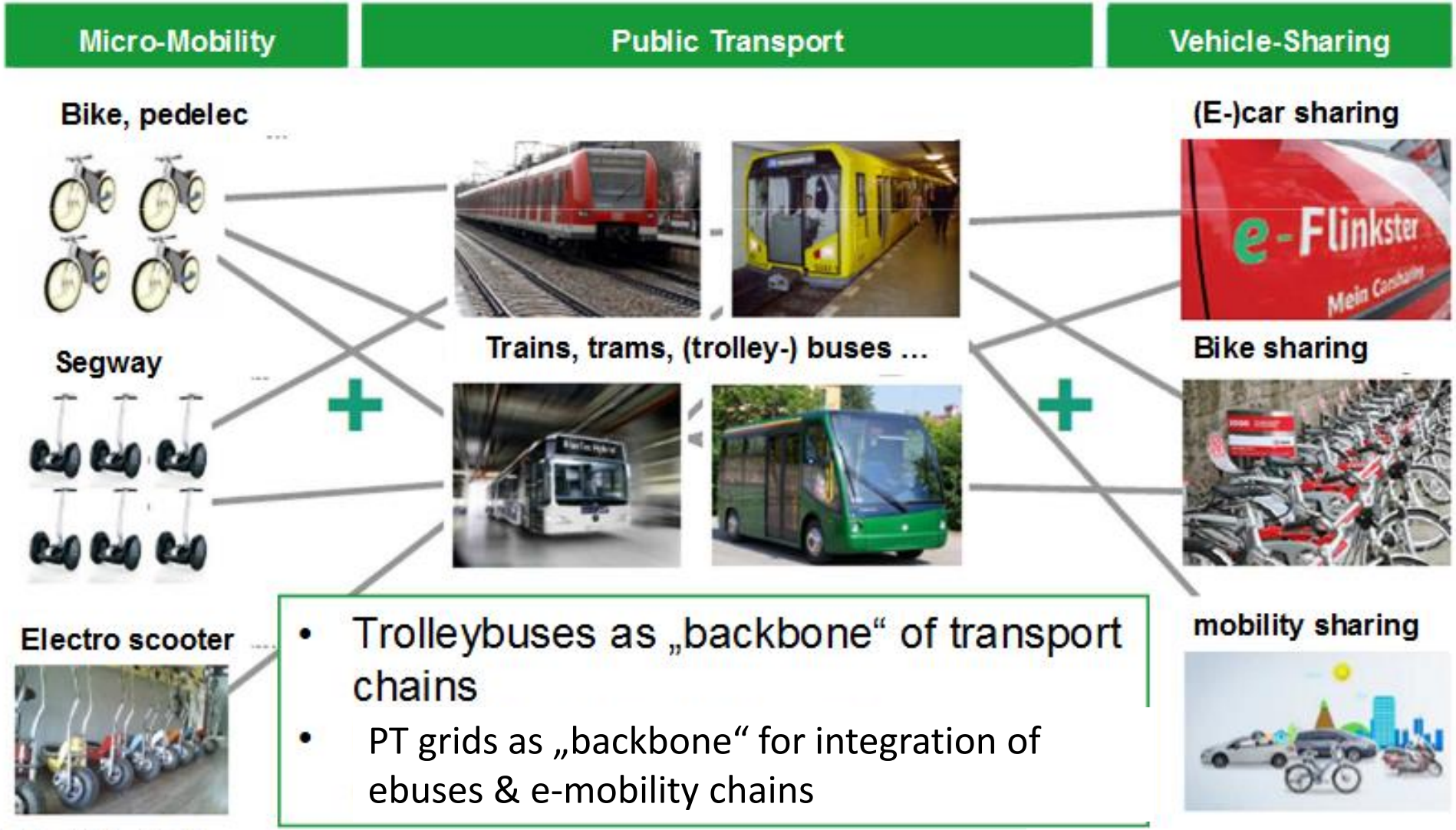
Electric public transport as a backbone of smart cities



Source: Spath, IAO, 2011

High capacity systems - BRT Shanghai

High capacity systems

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BRT Rimini (under implementation; no MaaS without Mass!)

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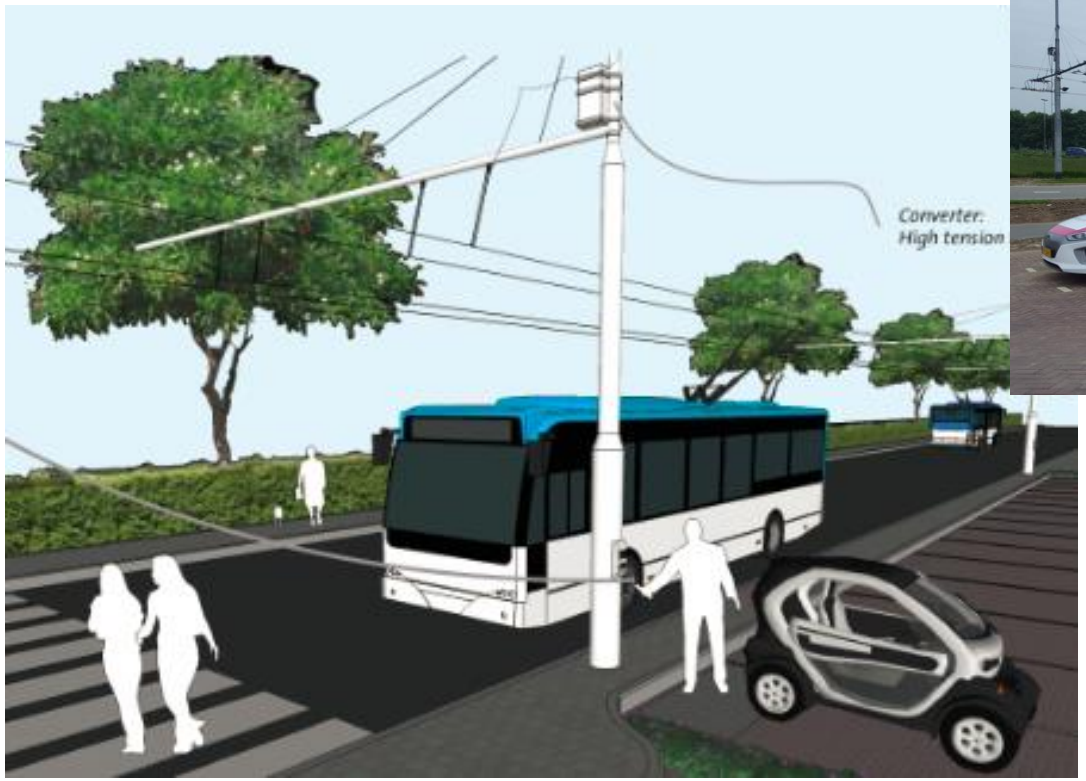
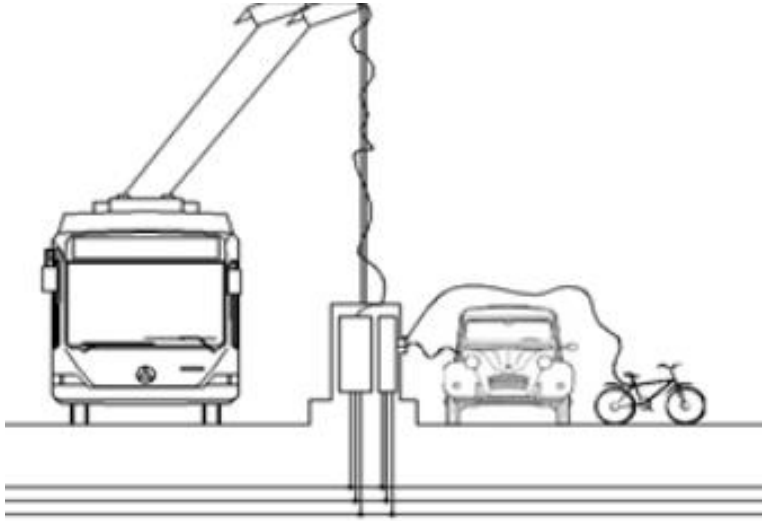
Multi-purpose trolley charging infrastructure in Arnhem, NL





http://www.omroepgelderland.nl/nieuws/2134955/Autorijden-op-energie-van-remmende-trolleybussen

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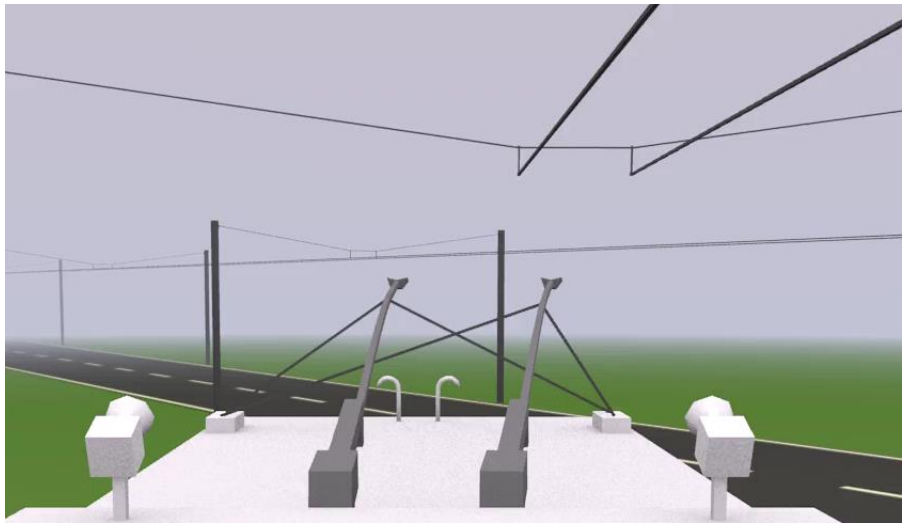
Prototypes & Innovations:

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)

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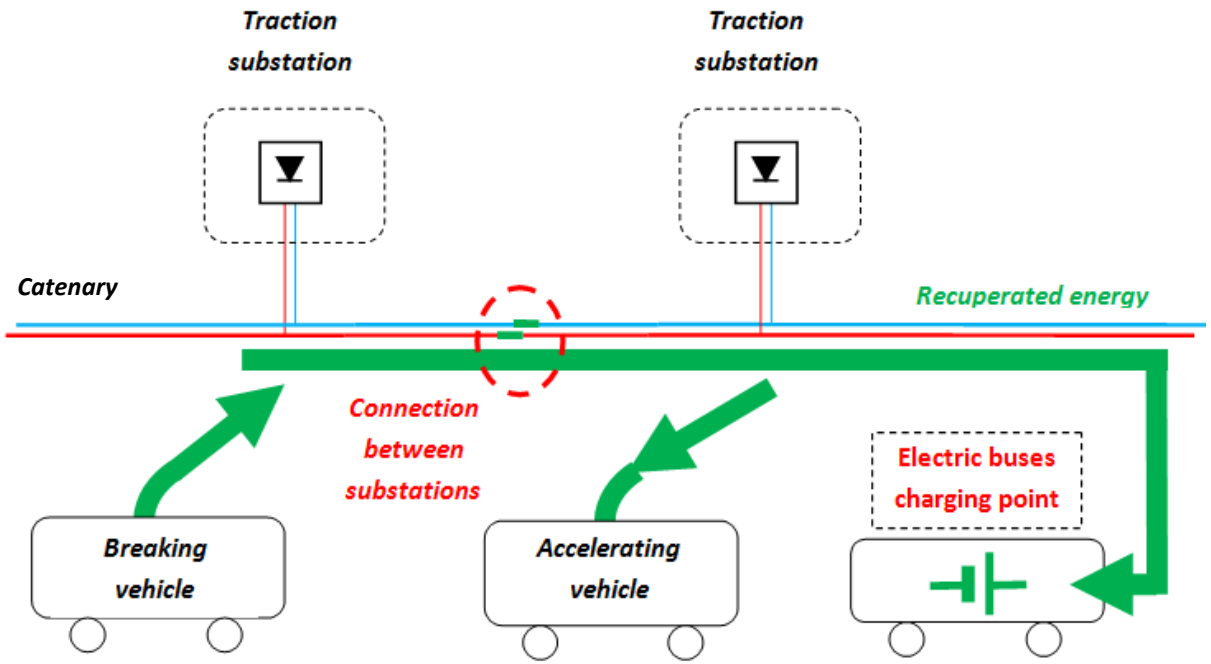
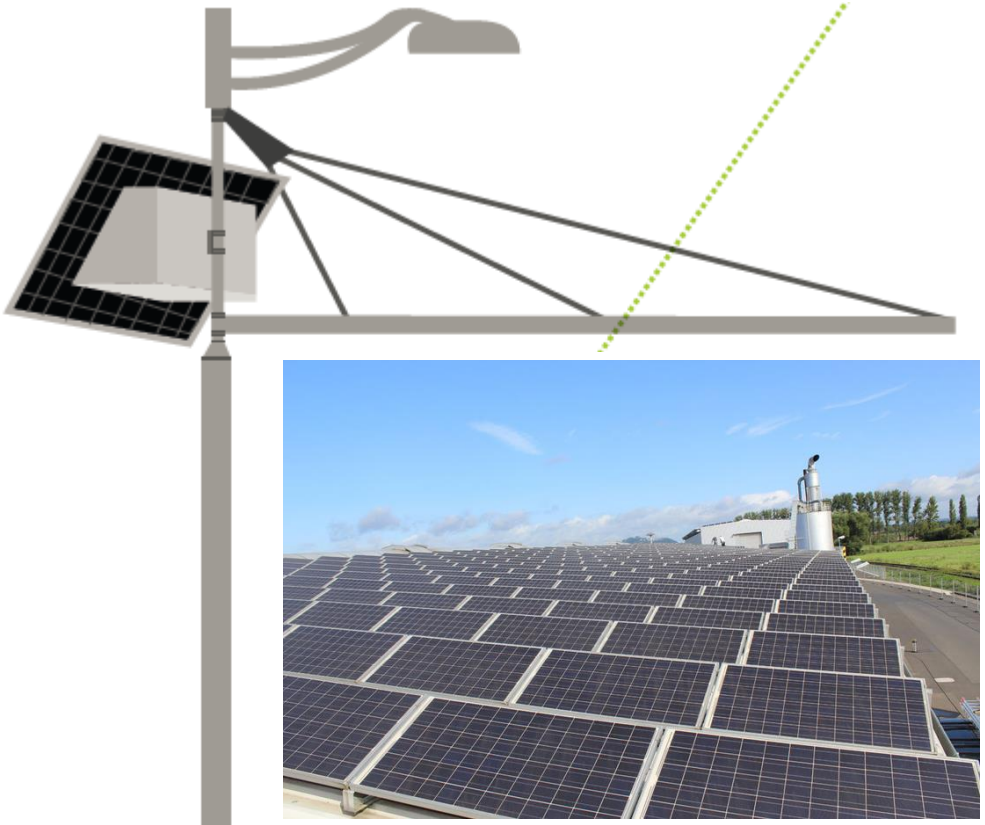
Smart trolley grids (physical and digital asset):



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)

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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**)

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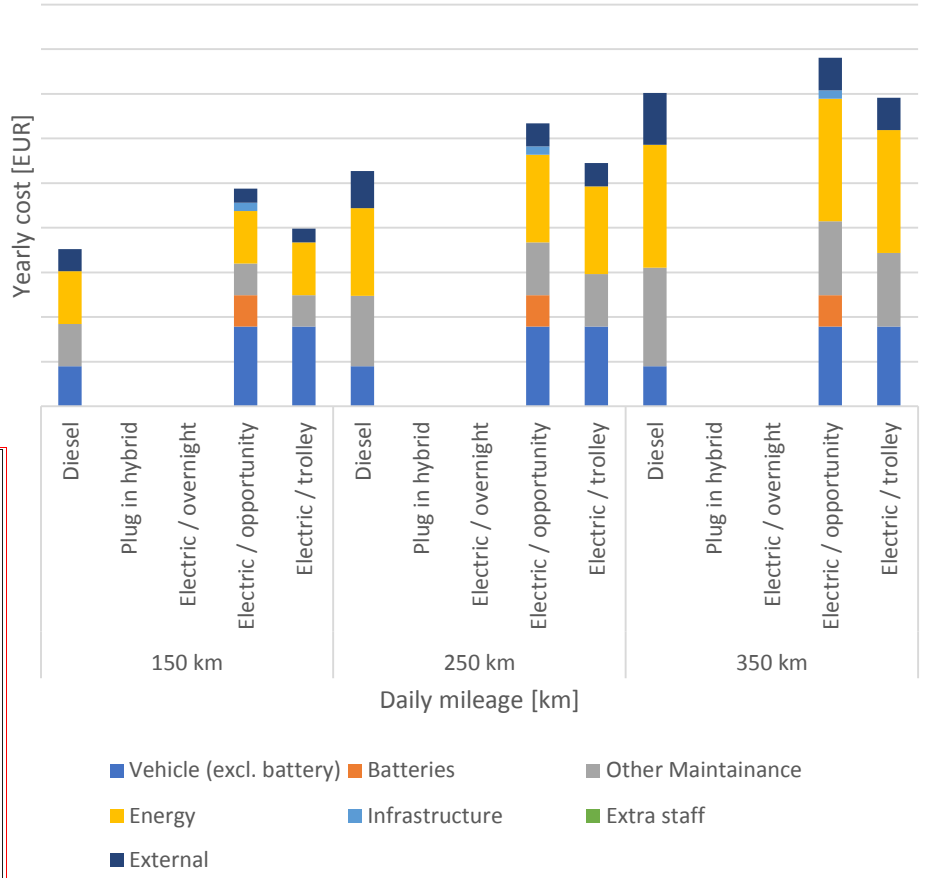
Trolley 2.0 User Forum Members

- Salzburg AG, AT
- Stadtwerke Klagenfurt, AT
- Stadtwerke Solingen, DE
- Budapest BKV, HU
- 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



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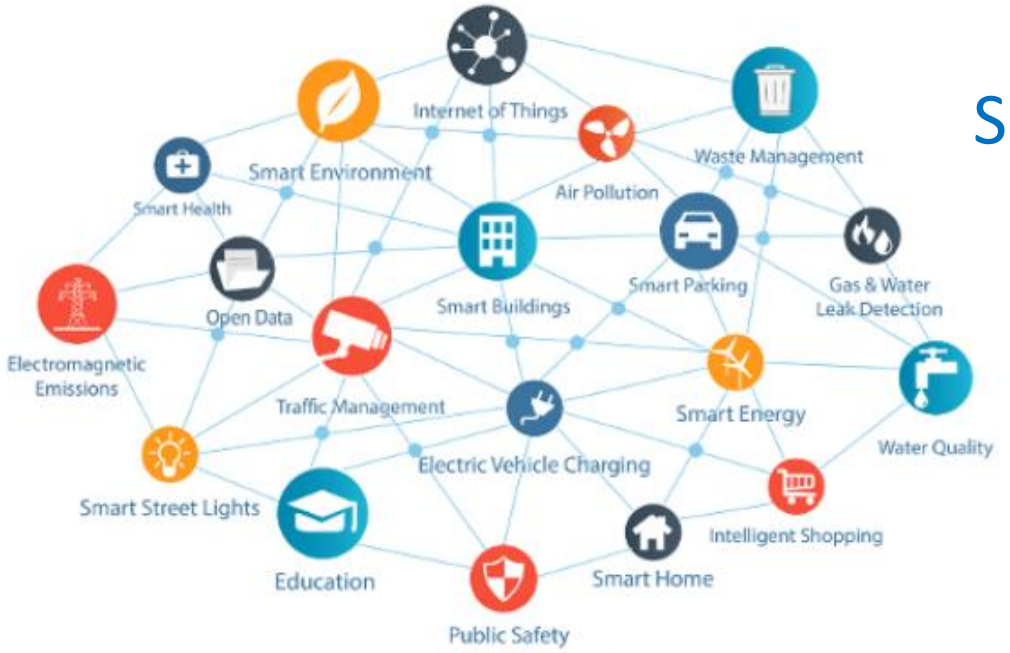
Smart cities & electric public transport – an integrative task!

Decarbonisation

Digitalisation

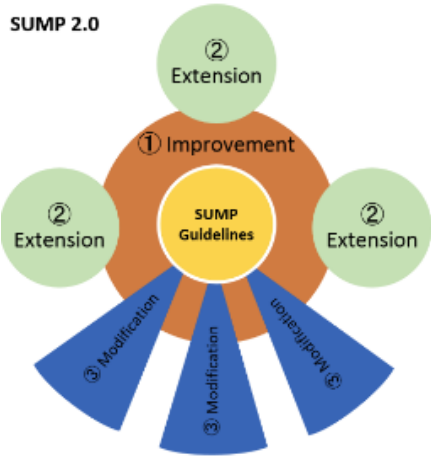
Automation



Smart policies

Clean Vehicle EUROPE

Smart planning



Interoperability

ASSURED

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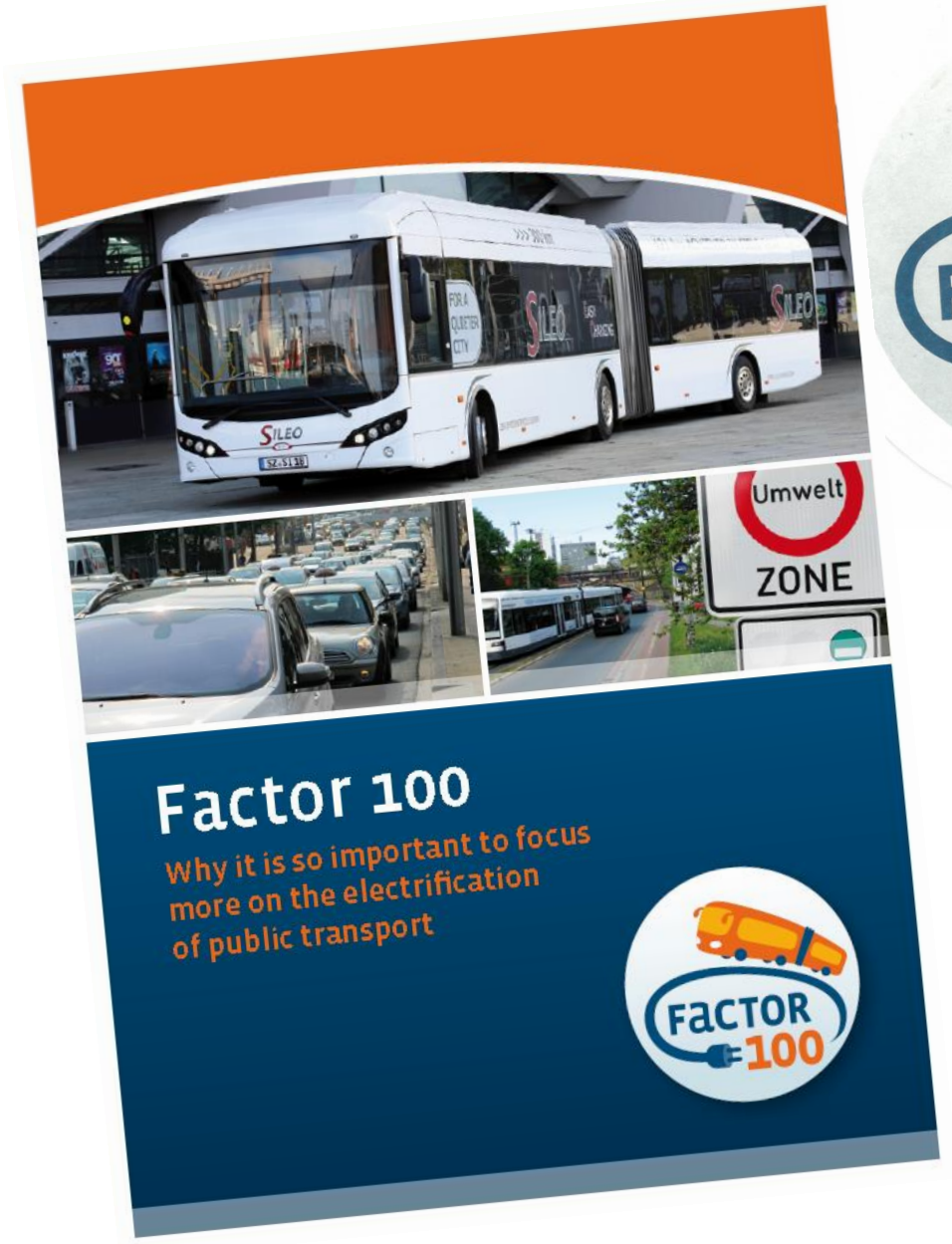
Factor 100


Umwelt
ZONE
Factor 100
Why it is so important to focus more on the electrification of public transport
FACTOR 100

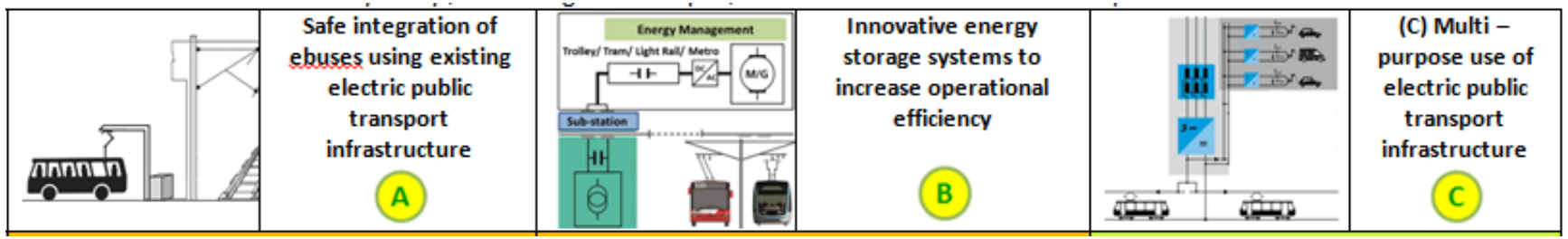

FACTOR 100


Did you know
that it takes 100 electric cars
to achieve the impacts
of one electric bus (18m)
(but there is not 100 times
the funding for electric buses)
eLIPTIC
www.eliptic-project.eu

Trolleybus systems for smart cities

Use the smart grid for:

- (re)charging “en route” (in-motion-charging) or on the spot (overnight charging in trolley depots) using existing electric trolley infrastructure;
- upgrading and/or regenerating trolley systems (optimized energy efficiency through energy storage systems, reversible substations, integration of RES)
- multi-purpose use of trolley infrastructure for safe (re)charging of non-public transport vehicles (electric bikes, cars/ taxis, vans, utility trucks)



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Let’s be smart together!

Thank you for your attention!

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