

Promoting **clean** public transport

Trolley

TROLLEY Roadmap - Research perspective on ebus future



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Chair for Electric Railways

Study profile

Planning and operation of electric traffic systems

Diploma course

Transportation Engineering

and additionally for

Electrical Engineering

Mechatronics



TROLLEY Roadmap – Research Perspective

► Best case for e-mobility: City transport



- **Powerful**
- **Faster**
- **Less noisy**
- **Cleaner**



TROLLEY Roadmap – Research Perspective

▶ **Involved stakeholders:**

- ▶ Technical University Dresden, DE
- ▶ Warsaw School of Economics, PL
- ▶ Metropolitan Research Institute, HU
- ▶ Lviv Polytechnic National University, UA
- ▶ National Energy Conservation Agency, PL
- ▶ Trivector Traffic, SE
- ▶ S2A Consulting, CH

TROLLEY Roadmap – Research Perspective

- ▶ **Greatest potential for further development of propulsion modes for public transport vehicles by 2020/2050?**
- ▶ **Long-term perspective** → efficiency advantages despite actual technology hypes
- ▶ **Product experience** “learning from application”
- ▶ **Technology results assessment** (we are just in the beginning of e.s.d. technology introduction)
- ▶ Trolley systems as a **proven bridge technology** for further electrification of public bus transport

- ▶ **Trends and biggest impact on the electrification of urban mobility in EU cities / what political action would be required?**
- ▶ **Oil price** development
- ▶ **Environmental** requirements (pollution, noise)
- ▶ Green City efforts
- ▶ **Long-term perspective** (congestion charging)
- ▶ Promotion of public transport modes vs. individual traffic within green cities

- ▶ **Game-changing technologies and scientific challenges for electric public transport in European cities of the next two decades?**
- ▶ **Long-term perspective:** Research & Development for battery systems, (fast) charging systems and inductive technology → “lessons learned”
- ▶ **Integrated urban city and traffic planning** → not technology-orientated but user-driven
- ▶ Efficient City traffic requires optimized transportation technology (not vice-versa)
- ▶ **Interdisciplinary research activities** with integration of EM in Sustainable Urban Mobility Planning (SUMP)

- ▶ **Promising strategies and business models to boost the introduction of electric public transport in future European smart cities?**
- ▶ Long-term perspective: **Life-cycle approach** (accompanying research activities necessary for comparability)
- ▶ **I&C technology** for smart energy management (smart metering, smart grid control, real time information interchange)
- ▶ **Integrated traffic and energy management**
- ▶ Existing substations as charging stations for other e-vehicles (trolley, tram metro etc. as backbone)

- ▶ **Future catenary network for trolleybus systems and auxiliary engines in trolleybuses by 2020/2050?**
- ▶ **Partial overhead catenary:** with automated wiring technology at travel speed → highly frequented lines remain with catenaries (due to energy efficiency)
- ▶ **Horizon 2020:** batteries and/or supercaps as well as Diesel technology optimization (esp. East Europe, due to climatic conditions); first examples already existing (TROLLEY Pilot Investment BBG)
- ▶ **Horizon 2050:** based on battery technology (supercaps only for peak load buffering)

- ▶ **Main factors that increase attractiveness of trolleybus systems and groundbreaking technologies needed for further development?**
- ▶ **Partial catenary networks:** supported by automatic wiring and de-wiring (at travel speed); combined overhead and inductive power supply
- ▶ **Financial instruments:** tax preferences and financing schemes (based on life cycle approach)
- ▶ Need for **high priority bus lanes/corridors**, especially in bigger cities to increase the capacity of trolleybus systems (integrated SUMP and EM planning)

► The ebus future - based on best practices:



Thank you for your attention!



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