



AMTU Event – 8th April 2014

Project Description

Prepared by: Umberto Guida – Head EU Projects Unit, UITP

Electromobility in Public Transport

Electrification already produced a **Revolution** in Public Transport...

From horses-powered to electrical trams

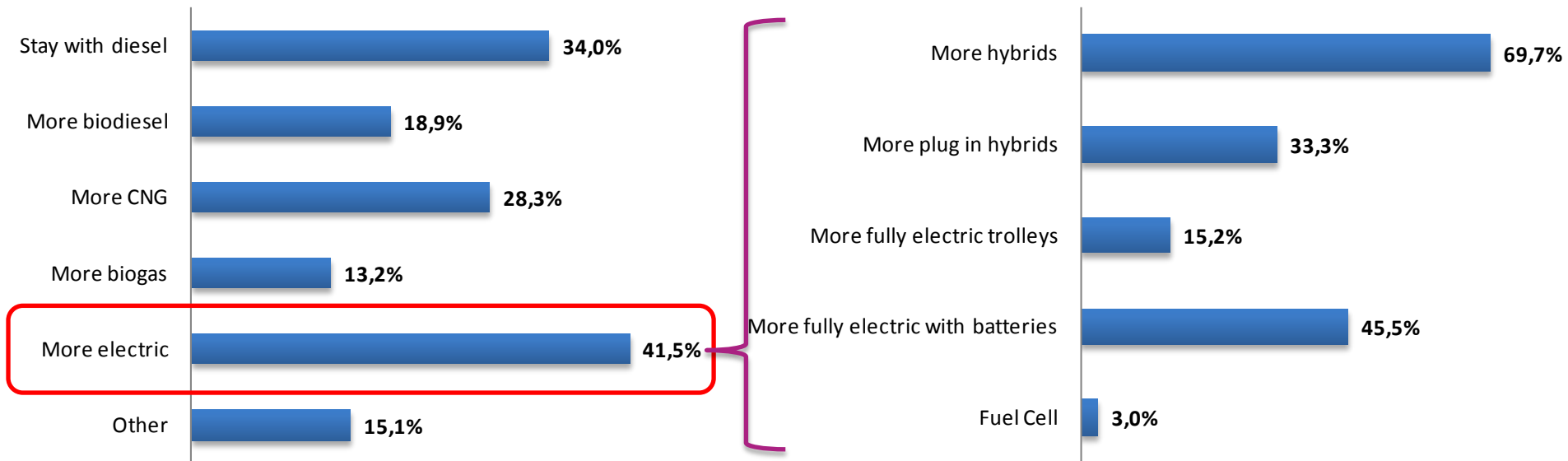
UITP was already following such trend:

The high cost of horses' maintenance vs. electricity traction was one of the key topics discussed at the UITP's Berlin Congress in 1886.



Why a project on Electric Buses?

1 – Great Interest from Urban Mobility Actors



Future plans for propulsion technology change

Source: 3iBS Project (DG-R&I)
70.000 bus / 130 M habitants

www.3ibs.eu

Why a project on Electric Buses?

2 – Large set of Available Technologies

Several technical options for fully electric bus operation

Specific aspects:

- Cost elements
- Technical and operational aspects
- Feasibility
- Environmental benefits

	Exchange of Batteries in the Bus	Exchange of Trailer	Exchange of Batteries in Trailer
Engineering Bus	--	++	++
Engineering Trailer	/	0 1a)	- 1a)
Engineering Infrastructure	-	-	-
Electrical and mechanical Safety	-	++	++
Reliability of the System 1b)	0	0	0
Freedom in design of the Passenger Compartment	+	++	++
Driving Dynamics	-	0	0
Effort for Standardisation of the System / Adjustment overall System	--	+	-
Techn. Effort of Battery System with Cooling	-	-	-
Reaction at medium-voltage Power Grid	0	0	0
Effort Refurbish Bus	-	++	++
Air Conditioning of the Bus	--	--	--

Legend		
++	Very advantageous	
+	Advantageous	
0	Neutral	
-	Disadvantageous	
--	Very disadvantageous	

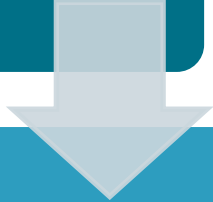
Technologies promising if put in their
“best operational conditions”

Source: EBSF Project (DG-R&I) www.ebsf.eu

Study by VDV and Prof. Dr. Ralph Pütz (Landshut University)
 Launch Event – Brussels – 23rd January 2014

Zero Emission Urban Bus Systems

Provide decision makers with **Guidelines** and **Tools** to support decision on “if” “how” and “when” to introduce electric buses in the *core* bus network



Evaluate the economic, environmental and societal feasibility of electric urban bus systems through demonstrations



Facilitate the market uptake of electric buses in Europe with dedicated support tools and actions

Zero Emission Urban Bus Systems

EU FP7
Demonstration
Project

€13.5m EU funding
(€22.5m total budget)

Coordinated by
UITP

40
consortium
partners

42 Months
November 2013
Aprile 2017



DG Mobility
& Transport



ZeEUS Objectives

ZeEUS aims to be the main EU activity about the introduction of electric urban bus systems in European City Bus Networks

- **Core Demonstrations**
- **Observatory of Electric Urban Bus Systems**
- **Networking activities**
- **Guidelines and Tools for Pre-Commercial Support**

ZeEUS Philosophy

Extend fully-electric solution to the core part of the urban bus network

Consolidated solutions for electric bus systems are already today in the streets.

- full-size trolley-buses
- Full electric battery mini/midi vehicles
- Full-size diesel-hybrid buses

The market for these solutions has already been already developed

ZeEUS looks to the next challenge!

- Vehicles of larger capacity (12m and more / double deckers)
- Urban-optimised mobility concepts and infrastructure

From **plug in hybrid** to **full electric**

System Approach adopted

- EBSF Methodology
- Interaction grid - vehicle

ZeEUS

Core Demonstrations Criteria

Demonstrations **do not use prototype** vehicles, but series or pre-series products

Vehicles operates in real operative services with passengers, already or soon permitted (**homologated**) for such a service

The **number of demo vehicles** in the demo is enough to perform a meaningful and statistically valid evaluation of the real impact of the solution on the operations

Different **geographical, climatic, environmental and operational conditions** represented in the demonstrations

ZeEUS Core Demonstrations selected from 45 candidate demos

ZeEUS Core Demonstrations



8 Demonstrations / 6 Countries

- Barcelona (ES)
- Bonn / Munster (DE)
- Glasgow / London (UK)
- Plzen (CZ)
- Cagliari (Italy - *to be confirmed*)
- Stockholm (SE)

35 Electric Buses high capacity

- Full Electric
- Plug-in Hybrid
- Battery trolley buses

Charging Infrastructure

- Slow charging – bus depot
- Fast charging - bus stations, terminals, stops – induction, catenary, contacts

ZeEUS Buses (today)



VOLVO



IRIZAR



ALEXANDER DENNIS



VDL



SKODA



SOLARIS

ZeEUS will closely monitor electric bus deployment around the world

ZeEUS Electric-Bus Observatory

Follow electric bus projects and initiatives in Europe and beyond

The Observatory will report about the activities in specific countries/regions:

- on-going pilots and tender actions
- legal monitoring
- urban and spatial planning regulations and guideline principles
- current practices, new technological or behavioral developments

PT National Associations (ASSTRA, UTP, VDV) will play a key role in the observatory reaching out to their members

Observed Demonstrations

Demonstrations and pilots funded by other National or European programs

Forum of discussion

Contribution to some strategic aspects (i.e. Electric Bus Roadmap)

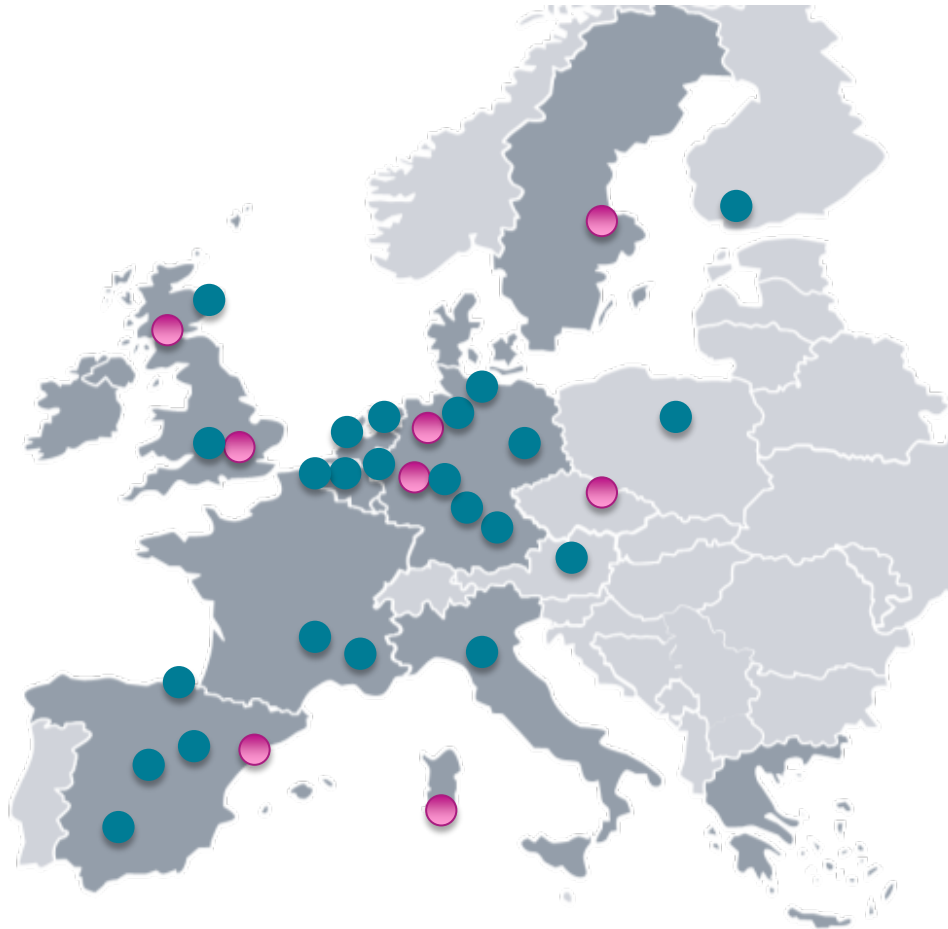
Monitored Demonstrations

Selected periodically within the Observed Demonstrations

More active participation to ZeEUS project:

- Local use of KPI within the ZeEUS set
- Further contribution to the UITP E-SORT validation

First group of Cities possible Observed Demonstration



- Leipzig, Hamburg, Augsburg, Osnabrueck, Mannheim, Wiesbaden **(DE)**
- Den Bosch, Utrecht, Maastricht **(NL)**
- San Sebastian, Madrid, Seville, Zaragoza **(ES)**
- Parma **(IT)**
- Grenoble, Albi **(FR)**
- Helsinki **(FI)**
- Milton-Keynes, Aberdeen **(UK)**
- Wien **(Austria)**
- Knokke, Kortrijk **(BE)**
- Warsaw **(PL)**

+ Arriva partnership

- Core Demonstrations
- Contacted cities

ZeEUS Networking Activities

EU Projects and Initiatives

- Bus Projects (CAPIRE, 3iBS...)
- EU Initiatives (Smart Cities & Communities, EGVI)
- Private transport electromobility (Green-eMotion)
- Electromobility in Freight transport (FR EVUE)

Urban electro-mobility Stakeholders

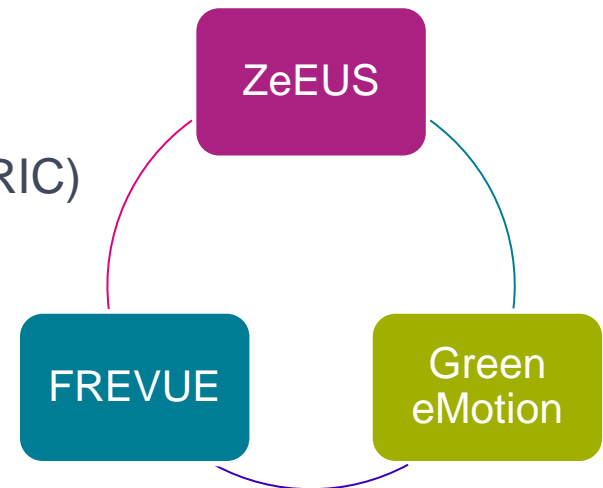
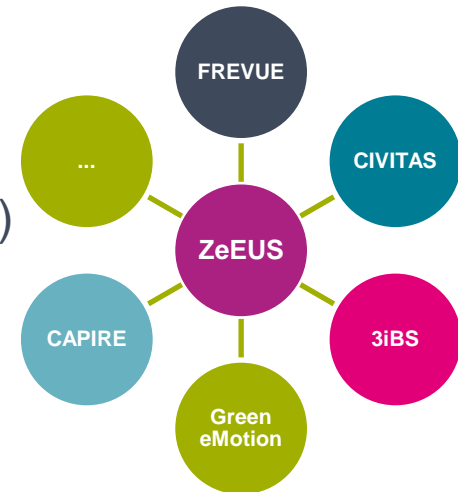
- European Electro-mobility Observatory by EC
- Joint Forum with Green-eMotion and FREVUE

European Associations & Networks

- Members Forum (POLIS, EARPA...)
- Outreach of the Electricity Industry (EURELECTRIC)

Public Transport Networks

- UITP Commission and Committees
- ZeEUS PT Working Group
- Liaison with UITP Regional Offices
- Y4PT (Youth for Public Transport)



ZeEUS - Guidelines and Tools for Pre-Commercial Support 1/2

Support decision makers to decide **if, how and when** to introduce electric bus systems in the Public Transport network

- **Regulatory frame** including operational aspects and standards
Link with proposed EU Directive on “*Deployment of alternative fuels infrastructure*”
- **Funding schemes, tools and procurement guidelines**
Interaction with EIB and other funding entities
Synergies with Structural Funds and ERDF
- Recommendations for **urban / spatial planning**
- **Operational concepts and migration scenarios**
- Electric Bus System **Roadmap**

ZeEUS - Guidelines and Tools for Pre-Commercial Support 2/2

- Strategy for **optimised interaction** with the power grid
 - Slow charging (overnight bus-depot)
 - Optimised charging strategy / business model
 - Fast charging at bus-terminal / bus-stop
 - Strategy for re-using existing PT power network
- **Standardisation**
 - Identification of priorities for standardisation (WHAT?)
 - WHAT to standardise: interfaces, energy exchange protocols...?
 - Link with proposed EU Directive on “*Deployment of alternative fuels infrastructure*”
 - Contribute to UITP **E-SORT** Validation
 - New chapter of UITP SORT cycle for full-electric
- **Training** guidelines for PT personnel
 - Drivers, maintenance
- **Education**
 - Education modules and workshops for university students



ZeEUS: 40 partners representing all stakeholders categories

Associations

- **UITP**; EURELECTRIC; VDV; UTP; ASSTRA; POLIS;

Bus Manufacturers

- ALEXANDER DENNIS; IRIZAR; SKODA; SOLARIS; VDL; VOLVO;

PT Operators and Authorities

- PMDP; SL; SPT; SWMU; SWBN; TMB; TfL;

Energy Suppliers, Company

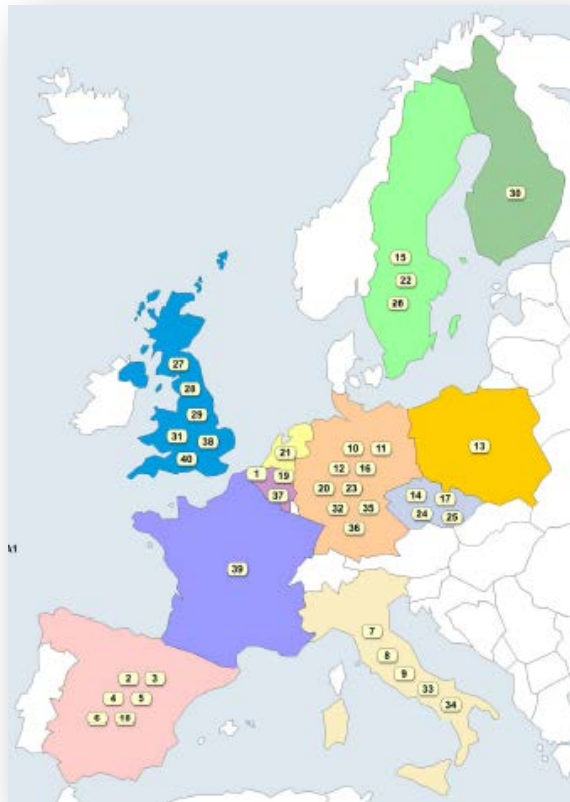
- ENDESA; PT, SSE, VATTENFALL

University and Research Centers

- FH LA; FRAUNHOFER IVI; RWTH; SAPIENZA UPC; UWB; VTT;

Technology Suppliers, Engineering, Consultant

- BERENDS, D'Appolonia, ENIDE, GMV, IDIADA, PE, TTR, TRL, VIKTORIA





DIPARTIMENTO DI INGEGNERIA CIVILE EDILE E AMBIENTALE



Launch Event – Brussels – 23rd January 2014