



International Association of Public Transport
Union Internationale des Transports Publics
Internationaler Verband für öffentliches Verkehrswesen
Unión Internacional de Transporte Público

UITP perspective and activities about future electrified bus systems

Umberto Guida – EU Projects Director – UITP

Umberto.guida@uitp.org - +32478910418

Workshop „The Future of Electric Public Transport“

12th March 2013 in Brussels

Summary

UITP approach to CO₂ emission

UITP Bus Committee activities

FTSO

Trolley Working Group

SORT for electric buses

UITP Projects

EBSF Electrification study from VDV

iBS (Innovative Bus Systems)
Roadmap

3iBS and Energy efficiency

ZeEUS – Zero Emission Urban bus
Systems

UITP approach to CO₂ emission

UITP, the European public transport undertakings and bus manufacturers jointly produced their approach to “decarbonisation of transport” and GHG emission reduction

Holistic approach

Modal shift: the best carbon reducing strategy

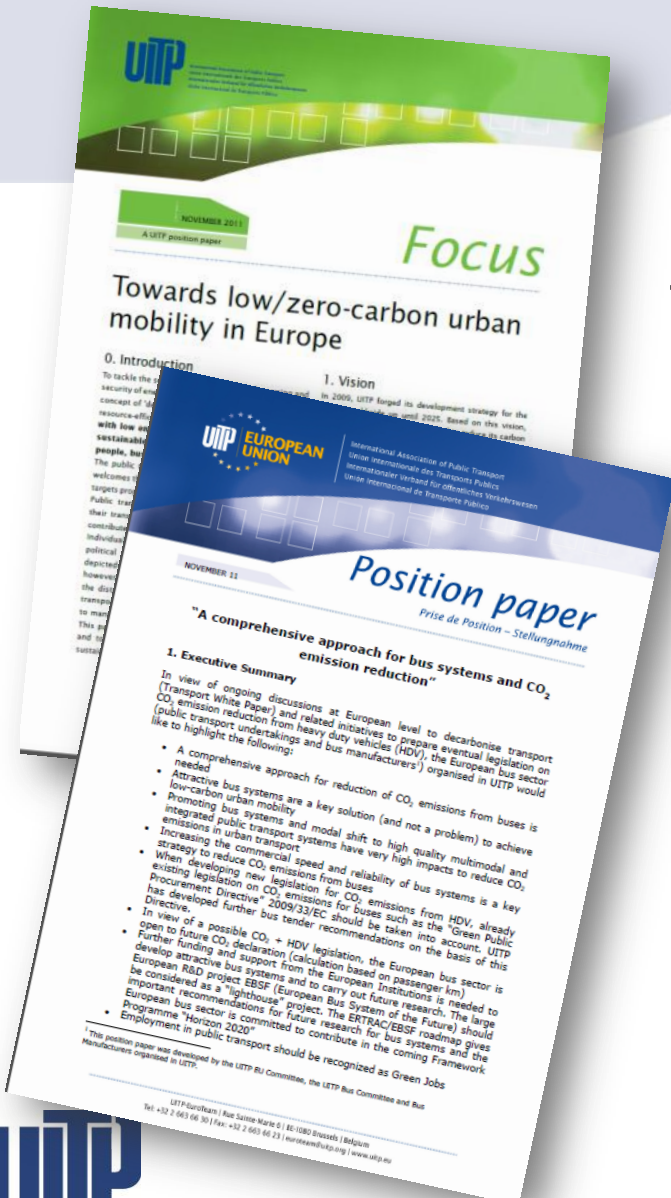
Traffic management

Infrastructure and operational issues

Smart energy use in vehicles

Electric Buses

Combined mobility



UITP Bus Committee 1/3

Fuel & Traction Systems Observatory (FTSO)

Follow evolution of technologies and relative market take-up

hybrids, fuel cells and hydrogen buses,
electric buses ...

Europe and worldwide

Current trends (worldwide)

level-off of new developments on gas and
bio-fuel buses

few developments of H2 / Fuel Cells
buses

sustained interest in hybrid buses

growing interest in electric bus systems

UITP Bus Committee 2/3



**Standardised
On-Road
Test Cycles
(SORT)**

Developed by the UITP Bus Committee in collaboration with bus manufacturers.

Address the lack of comparable information on bus fuel consumption

Allow to compare offers during a call for tenders

UITP Bus Committee SORT WG has developed new SORT-Hy for hybrids

In validation until 18th April

Launch at UITP World Conference 27th / 29th May

New version for electric busses SORT-E in development – on by end 2013

UITP Bus Committee 3/3

Trolleybus Working Group

Set-up in 2004

58 members

Objectives

Monitor Trolleybus development

Knowledge exchange

Advocacy campaigns and papers

Policy and Technical topics

Composition

Policy subgroup

Technical (electric and mechanical)
subgroups

UITP Projects: EBSF 1/5

European Bus System of the Future

EBSF Project

EBSF recognised as reference
for Bus System research in
Europe

- Definition of EBSF System
- Development and test of innovation on vehicle
 - accessibility, driver workplace, modularity, energy management
- Development of innovation on infrastructure and operational concepts
 - Interchanges, bus station
- 7 EU Use Cases
- Vision and Recommendations
- IT Standard architecture development and test

Electrification Study

1st Part.

Options for Line-Service Bus Systems with Fully Electric Operation for Complete Circulations

by Prof. Dr. Ralph Pütz (*Landshut University*)

2nd Part.

Use of urban rail infrastructure for electrification of urban mobility

by Prof. Dr. Müller-Hellmann

Presented at UITP workshop "Infrastructure and business models for electric mobility in cities - what role for public transport?" – 5th March 2013, Bruxelles

Both available on www.ebsf.eu



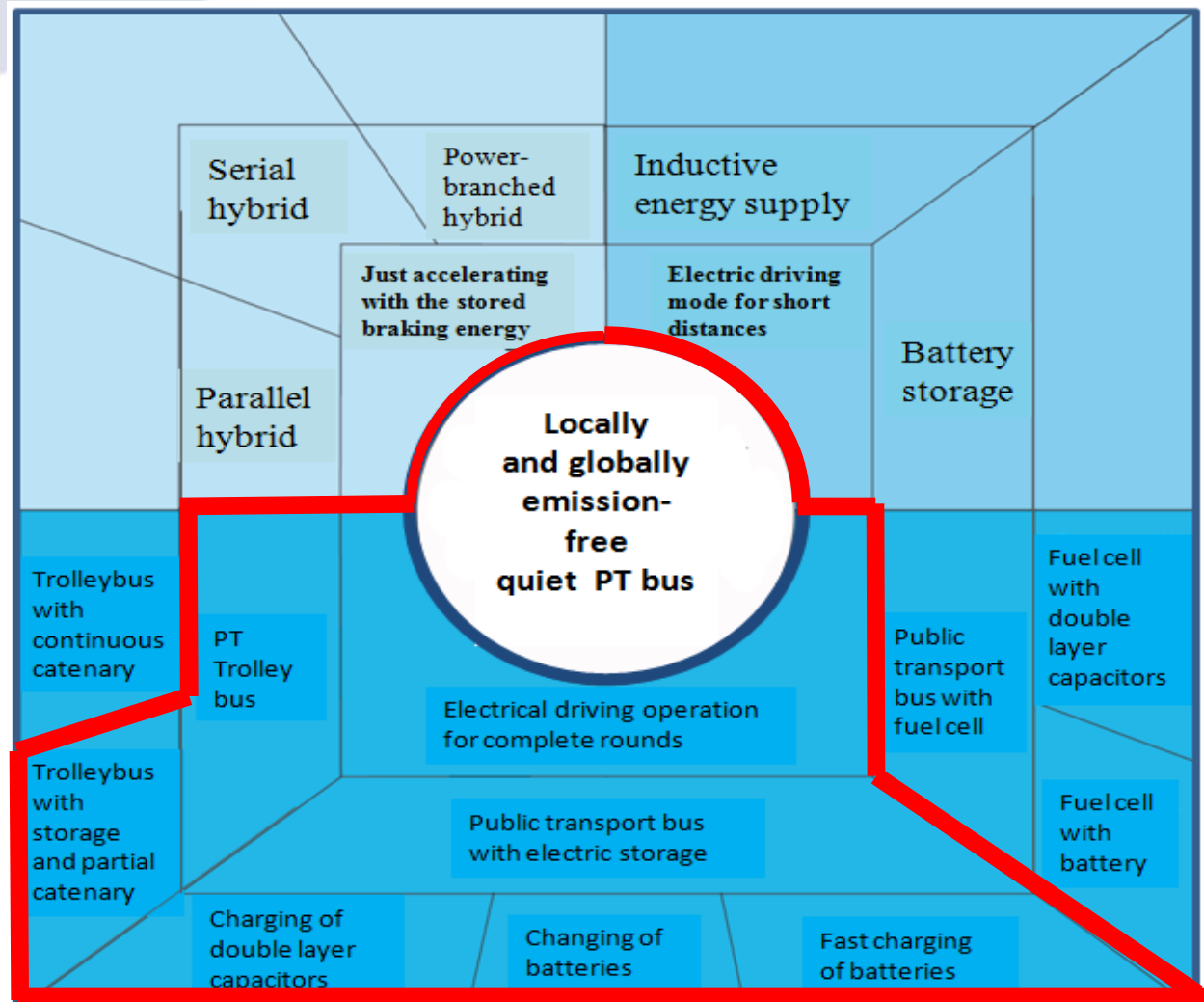
UITP Projects: EBSF 2/5



Electrification Study pt.1



Source:
Müller-Hellmann,
VDV



UITP Projects: EBSF 4/5



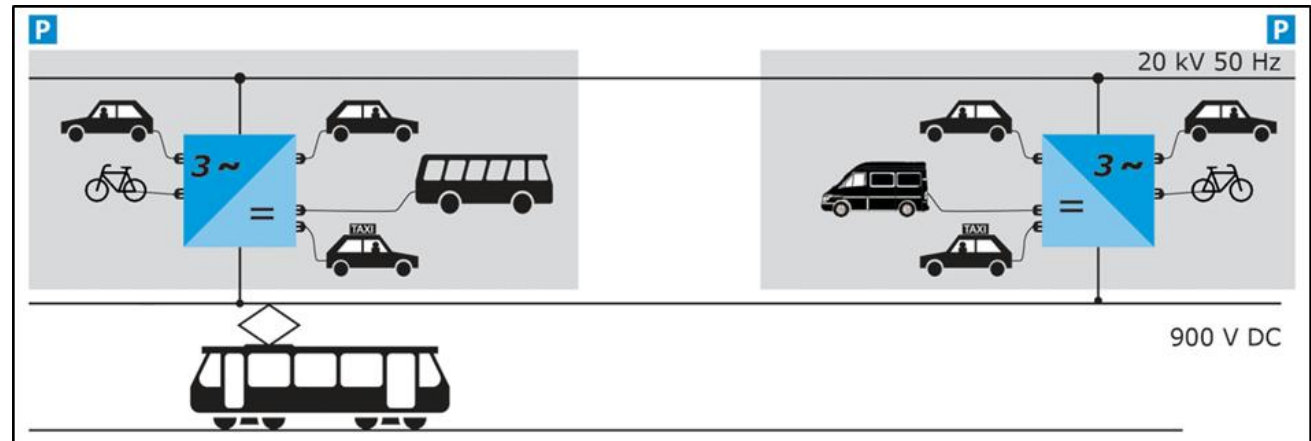
Electrification Study pt.2



Existing European public transport energy distribution network is a very low-cost basis to set-up a large (and even fast) charging infrastructure for urban passenger and freight transport.

Power supply infrastructure of a light rail system is suited for covering the high power demand needed for fast charging of battery buses.

Rectifier stations can be used as charging station positions for all kinds of electric vehicles.



UITP Projects: EBSF 5/5

P&R car park with substation of the Kasseler-Verkehrs-Gesellschaft AG



**Electrification
Study pt.2**



UITP Projects: iBS Roadmap 1/2

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iBS Roadmap

Identify areas and priorities of Research about Urban Bus Systems

First issue in 2011 (ERTRAC)

Developed with the contribution of more than 100 stakeholderstransport

- Bus system integration in new urban scenarios
- EBSF ICT platform integration and standard adoption
- Definition and development of sustainable bus system
 - Energy efficiency
 - Environmental performances
 - **Electrification of bus systems**
- Innovative vehicle technologies (comfort, accessibility...)
- Modularity (technology and operational concepts)
- Mobility challenges of an ageing society

Reference document for Bus System research

On-going update (03-13)

Contribute to STTP roadmap for electrification of road transport

UITP Projects: iBS Roadmap 2/2



Concepts/technologies for fast energy charging during service operation

to maintain a high availability of buses.

Adaptation/redesign of vehicles

to take into account full electrification

Design of infrastructure for energy charging at depots/major bus stops/terminals

Adaptation of maintenance infrastructure/processes

European platform for expertise exchanges, feedbacks and investigations.

Development of business models

Trolleybuses:

breaking energy recuperation and feedback to the grid

Energy management and storage systems

Contact-less concepts/technologies for increasing autonomy

UITP Projects : 3iBS 1/2

EBSF Project

EBSF shown that joint resources for pre-competitive research works

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iBS Roadmap

First Roadmap for Bus System research developed

Collect consensus of more than 100 Bus System stakeholders

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3iBS Project

UITP Projects: 3iBS 2/2



**Innovative,
Intelligent,
Integrated
Bus System**

Stimulated coordinated research in Europe
Maintain the **iBS Roadmap** + suitable funding frames

Support bus sector innovation

Translate PT sector strategies into plans for innovation

Stimulate exchanges between worldwide experts about innovation in bus systems

3iBS topics for Urban Bus Systems:

Accessibility and safety

Bus service operations during Special events

Intermodality

Level of service

Modularity internal and external

Energy sustainability

IT Standardisation

Certification of hybrid SORT cycle

UITP Projects: NODES

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- *Definition of EBSF System*
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3iBS Project

NODES Project

Integration of interchange station in the energy network as platform for electromobility services and electric vehicles infrastructure charging.

Influence of electrification of public/private transport, including grid connected vehicles, on planning, design and management of the interchanges.

ZeEUS Proposal

EBSF Project

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3iBS Project

NODES Project

ZeEUS Proposal

Evaluation on-going

ZeEUS

Zero Emission Urban bus Systems

Evaluation
on-going

ZeEUS – Zero Emission Urban bus Systems

Objective: *demonstrate the economic, environmental and societal feasibility of electric urban bus systems*

Answer EC DG-MOVE Call “Demonstration of Electric Buses as Urban Public Transport”

July 2012

Evaluation by the European Commission on-going

Results expected soon

If successful, negotiation and launch within 2013

ZeEUS Philosophy

Evaluation
on-going

*Extend fully-
electric
solution to
wide part of
the urban
network*

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

- full-size trolley-buses

- Full electric sized battery-based mini/midi electric vehicles

- Full-size diesel-hybrid busses

The market for these solutions has already been already developed

ZeEUS looks to the **next challenge!**

- Development of vehicles of larger capacity (12m and more)

- Urban-optimised mobility concepts and infrastructure

System Approach suitable for electric bus systems

- Interaction grid - vehicle

ZeEUS Demonstration key Criteria

Evaluation
on-going

UITP set of criteria for ZeEUS demonstrations

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

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

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

The **commitment** of all the relevant stakeholders ensured since the proposal

Different geographical, climatical, environmental and operational **conditions** are represented in the set of selected demonstrations

ZeEUS Demonstrations

Evaluating

Stockholm
Plug-in
8 x 12m vehicles
12m
Volvo
Fast charging at end stations, automatic to the roof of the bus
Hemiboreal
Full scale operation

Barcelona
Full electric, Plug-in
4 x 12m vehicles
12m
Irizar, Alexander Dennis
Overnight slow charging at the bus depot
Mediterranean
Different technologies. Effect of auxiliaries

London
Plug-in
4 x DD vehicles
double deck
Alexander Dennis
Inductive charging at end stations, slow charging at bus depot
Central European
24h operation

Muenster
Full electric
5 x 12m vehicles
12m
VDL
Fast charging at end stations and at depot
Central European
Charge through robotic system. Energy buffer at charging stations.

Glasgow
Plug-in
4 x 12m vehicles
12m
Alexander Dennis
Inductive charging at end stations
Central European
Targeted at air quality management areas (GPS switch)

Plzen
Full electric
2 x 12m vehicles
12m
Skoda
Fast charging at bus terminals, slow charging at bus depot
Central European
Nano-technology batteries. Automatic collector connection

Bonn
Full electric
4 x 12m vehicles
12m
Solaris
Fast charging at terminal stops, slow charging at bus
Central European
Full scale operation.

Rome
Trolley bus retrofit
4 x 12m vehicles
18m
Solaris/GANZ / FAAM
Fast charging using trolley grid, when within the coverage area
Mediterranean
Catenary-free operation for large part of the line

Observed and Monitored Demonstration 1/2

Evaluation
on-going

Want to propose
a **Monitored /
Observed**
demonstrations?
Contact me! -
[Umberto.guida@
uitp.org](mailto:Umberto.guida@uitp.org)

Next years scenario

Increase of tests, pilots and purchase of electric buses
« *New* » industrial actors developing solutions for buses

ZeEUS is set to bring in the project the widest set of direct experiences that are running or will run in the next year

Electric-Bus Demonstrations Forum

Funded by other National or European programs

Observed Demonstrations

Member of a dedicated Group
Contributing to the definition of a EU Roadmap

Monitored Demonstrations

Selected periodically within the Observed
Active participation to ZeEUS project
Local use of some KPI within the set defined by ZeEUS
Contribute to the SORT-E validation
Joint procurement

Observed and Monitored Demonstration 2/2

Evaluation
on-going

Want to propose
a **Monitored /
Observed**
demonstrations?
Contact me! -
[Umberto.guida@
uitp.org](mailto:Umberto.guida@uitp.org)

Already collected interest

Leipzig, Hamburg, Augsburg (Germany)
Den Bosch, Utrecht (Nederland)
San Sebastian, Madrid (Spain)
Parma (Italy)
Grenoble (France)
Helsinki (Finland)

Contacts with

Wien, Salzburg (Austria)
Brussels (Belgium)
Brabant (Nederland)
Essling am Neckar, Osnabrueck, Mannheim
(Germany)
US, China...

...

Networking

**Evaluation
on-going**

**ZeEUS aims to
be the main
EU activity for
following
experiences
and
developments
of electric
urban bus
systems**

Other project and initiatives

Projects (CAPIRE, 3iBS)

Initiatives (Smart Cities & Communities, EGVI)

Developments, pilots, demos and procurements of electric buses

Observatory of electric bus systems activities

Demonstrations Forum (Observed/Monitored)

Outreach of Public Transport domain (UITP COMs)

Energy Companies and Providers

Outreach to the Electricity Industry (EURELECTRIC)

Private transport electromobility (Green-eMotion)

Link to relevant activities in other domains

European Electro-mobility Observatory by HyER

Electromobility in Freight transport (FR EVUE)

Link with Communities, Associations and Networks

Stakeholders forum (POLIS, EARPA...)

Other ZeEUS Activities

Evaluation
on-going

Standardisation

- Identification of priorities for standardisation

- SORT-E Validation

Tools to support decision makers in deciding “if”, “how” and “when” to introduce electric bus systems in the Public Transport network:

- Electric Bus System Roadmap (as part of iBS Roadmap)

- Regulatory / funding frame and methodologies

- Procurement guidelines

- Operational concepts and migration scenarios

Training and education

- Training guideline for PT personnel

- Education modules and workshops for university students

ZeEUS Partners

Evaluation
on-going

Associations

UITP; EURELECTRIC; VDV; UTP; ASSTRA; POLIS;
HyER; EARPA

Bus Manufacturers

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

PT Operators and Authorities

ATAC; PMDP; SL; SPT; SWMU; SWBN; TMB; TfL;
Veolia Transdev Finland;

Energy Suppliers, Company

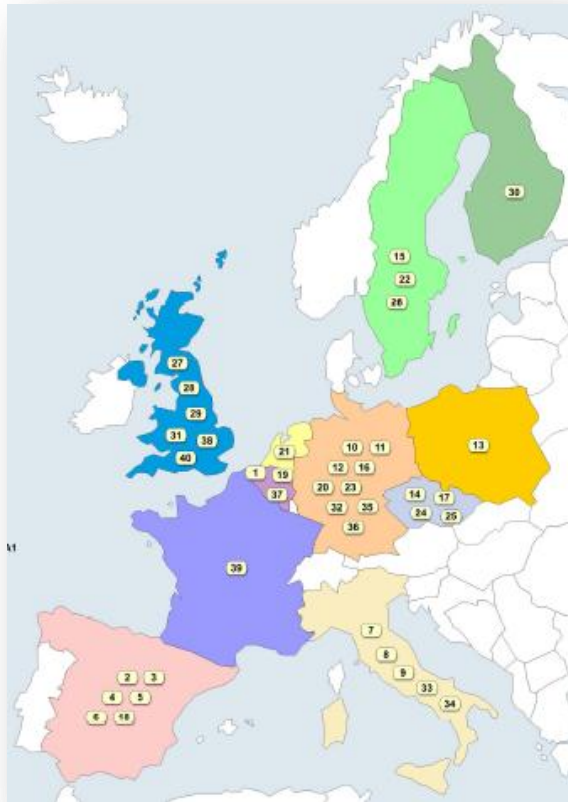
ENDESA; PT, SSE, VATTENFALL, *UK Power
Network; ELECNO*R;

University and Research Centers

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

Technology Suppliers, Engineering, Consultant

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



THANKS FOR YOUR ATTENTION!



Join us in Geneva May 26th to 30th, 2013

umberto.guida@uitp.org

