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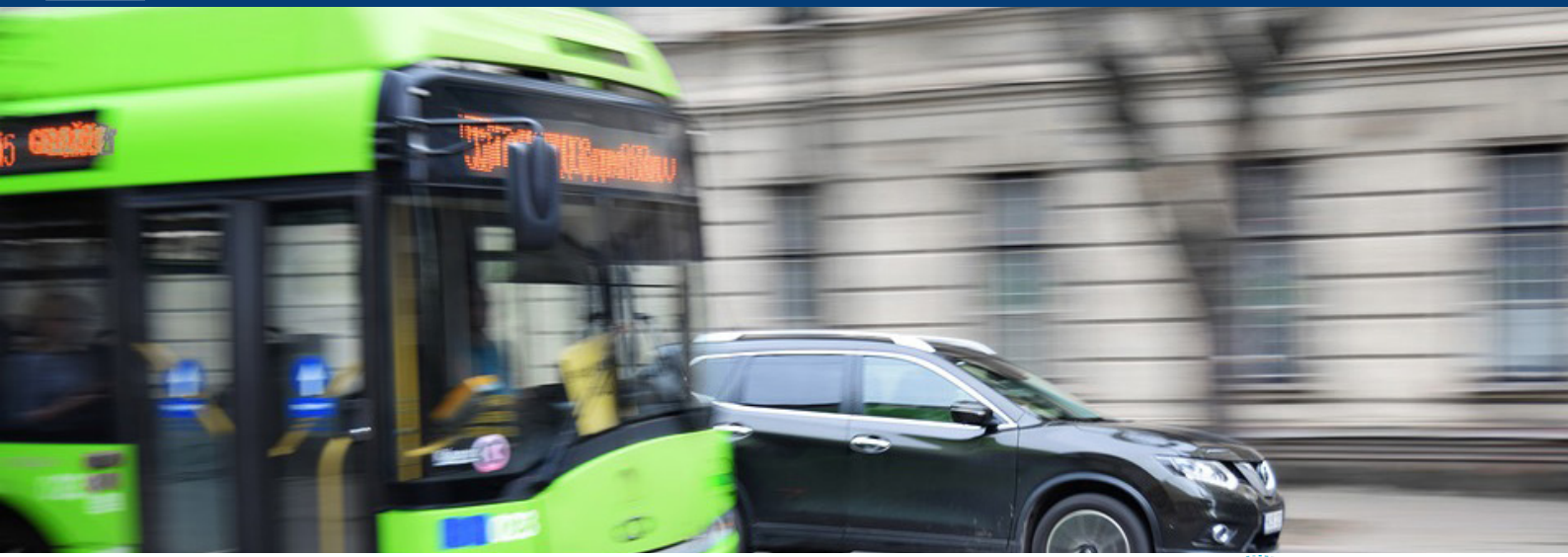
Factsheet

Trolley Bus System



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Solutions project

UEMI SOLUTIONS

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Urban Electric Mobility Initiative (UEMI) was initiated by UN-Habitat and the SOLUTIONS project and launched at the UN Climate Summit in September 2014 in New York.
UEMI aims to help phasing out conventionally fueled vehicles and increase the share of electric vehicles (2-,3- and 4-wheelers) in the total volume of individual motorized transport in cities to at least 30% by 2030. The UEMI is an active partnership that aims to track international action in the area of electric mobility and initiates local actions. The UEMI delivers tools and guidelines, generates synergies between e-mobility programmes and supports local implementation actions in Africa, Asia, Europe and Latin America.

Solutions

SOLUTIONS aims to support the exchange on innovative and green urban mobility solutions between cities from Europe, Africa, Asia and Latin America. The network builds on the SOLUTIONS project and brings together a wealth of experience and technical knowledge from international organisations, consultants, cities, and experts involved in transport issues and solutions.

The overall objective is to make a substantial contribution to the uptake of innovative and green urban mobility solutions across the world by facilitating dialogue and exchange, promoting successful policy, providing guidance and tailored advice to city officials, fostering future cooperation on research, development and innovation.

Aims

SOLUTIONS_UEMI supports urban mobility implementation actions that contribute to the Paris Agreement and the New Urban Agenda.
Sustainable energy and mobility can make positive contributions to a number of policy objectives, nationally and locally. In particular in cities there is a great potential to create synergies between for example safety, air quality, productivity, access and climate change mitigation. A UEMI resource centre will provide opportunities for direct collaboration on projects focusing on sustainable urban mobility and the role e-mobility can play in it. The UEMI will pool expertise, facilitate exchange and initiate implementation oriented actions.
UN-Habitat, the Wuppertal Institute & Climate Action Implementation Facility jointly host the resource centre for the Urban Electric Mobility Initiative, aiming to bridge the gap between urban energy and transport and boosting sustainable transport and urban e-mobility.

In brief

Trolleybuses are buses that run on electricity provided by overhead wires, giving them similar characteristics to rail modes (such as metro and light rail systems), powerful traction and fixed alignments. However, unlike these modes, they are cheaper to construct and have greater operational exibility. In addition, the combination of rubber tires with electric propulsion makes the trolleybus a mode which performs well and which has a low negative environmental impact.

In brief

Examples

The trolleybus has been a mode of urban transport since the 1880s, reaching the peak of its development after World War II. The system benefits from the combination of different public transport system characteristics such as trams and regular buses. It requires cheaper infrastructure than rail; can avoid traffic easily; is quieter than motorbuses; and is more environmental friendly.

Nowadays, due to its several advantages, there are around 300 trolleybus networks in 43 countries, with over 40 000 buses operating around the world. Many major European and Asian cities operate trolleybus systems including Vancouver (Canada), San Francisco (USA), Geneva (Switzerland), Lyon (France), Athens (Greece), Wellington (Australia) and Moscow (Russia). In many of these places, trolleybuses are the backbone of the public transport system.

The features of a full trolleybus system are:

- Overhead lines (wires)
- Traction wheels
- Pole ropes
- Trolley poles
- Spacious interior design
- Pre-paid ticketing systems
- Electronic payment collection systems (using smart-cards)
- Centralised control systems
- User-information systems

Examples

Results

Most of the countries have preserved trolleybuses simply because they help cities grow. Trolleybuses are cheaper than trams, have better hill-climbing traction and can avoid traffic easier. They produce minimal noise, are adaptable to different road character-

Results

istics and last long. The only negative impact is the overhead wire which some find unpleasant to look at. In San Francisco, passengers prefer to ride on trolleybuses, with 10-15% of people using the transport in the last decades.

Increasing awareness of climate change and the urgent need to prepare for a post-petrol era have prompted most of the world's developed countries to look into alternatives on transport systems that rely more in energy-efficient vehicles. Trolleybuses can play a strong part in urban transport for years to come.

Technical and financial considerations

Technical and Financial considerations
Trolleybus systems do not cost as much to construct and implement as other rail systems, but they do cost about 30% more than motorbuses. On the other hand, the normal working life of trolleybus is 20 years, and that of motorbuses is 14; meaning that the annual depreciation is only 9% higher.

Installing the power supply and overhead wiring network is expensive compared to the infrastructure needed for regular buses. Nevertheless, a network used by a city intensively and for a prolonged period can recoup the initial costs over some years.

The maintenance cost of the overhead wiring is an extra expense, but the overall costs of a trolleybus system are at least 20% less than that for motorbuses. The operating costs of trolleybuses depend largely on the price of energy. Regarding technical considerations, installing a trolleybus system will require several modifications to urban surroundings.

Policy/Legislation

Policy/legislation
Mass transport corridors such as trolleybus systems can be part of short- and long-term mobility solutions for small, medium and even large cities.
In terms of the institutional framework, best practices clearly show the need to have a single transport agency in charge of planning, managing and controlling the di erent transport modes. Overall, cities must help public transport initiatives with regulations, programs and:

- Land-use planning instruments;
- Environmental standards (including fuel efficiency and technology);
- Public transport quality-of-service plans;

- Fare regulations;
- Public transport subsidy schemes;
- Operational regulations.

Institutions

Institutions
Leading institutions that promote trolleybus systems are commonly agencies responsible for transport planning, such as mobility ministries, transport departments and/ or planning institutes. The authority level (federal, state or local) depends on the existing institutional and legal frameworks. It is necessary to coordinate with entities responsible for the environment, urban development, public space, public works, social and economic development and social communication; the secretary of state (or related local agency); and the nancing agency from the planning through to the implementation stages.

Transferability

Transferability
Trolleybus systems, rst developed in Europe, spread across the world to Asia, Oceania, North America and, most recently, to South America. In the past, several African cities also introduced the transport system.

Any city can easily implement this system as its light infrastructure makes it exible to any kind of urban context, topography and climate. Trolleybuses are a good sustainable transport option for developing countries due to their relative low construction and operational costs.

Case Study: Castellón and the region of Valencia (Spain)

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Context
Castellón is a coastal Spanish municipality 70 km away from Valencia. It has a population of 175 000, and is the centre of an urban region that reaches nearly 300 000 inhabitants.
In 1994, Valencia introduced a new tramway line which initially carried 20 000 passengers a day, while the complete bus network of Castellón provided service to no more than 15 000 passengers. The region urgently needed new transport system. A trolleybus system seemed like the best option because it was environmental friendly; exible enough to allow partial openings and operation; had the capacity to meet the expected demand at peak hours; and it would be

cost-e cient regarding its construction and further operation.

In action

In action
In 2005, the Valencian Regional Government decided to introduce a trolleybus transport system, with a 35 km long network meant to serve the entire urban region and the city itself. To implement the system successfully, the government:

- Defined technical characteristics for the system: energy supply, electrical infrastructure, a dedicated bus lane, platforms, efficiency, and general layout of the network
- Defined technical base characteristics
- Performed dedicated studies for the whole network
- Conducted a general tra c study in Castellón to consider all possible route interactions inside the old and narrow city streets

The trolleybus divides into seven different and independent sections, and operates in separated lines, which makes it different from other trolleybus systems. The investment in infrastructure of the whole network was an estimated € 140 million, not including the cost of vehicles. The first phase of the project was completed by mid 2006.
The system was operational in June 2008, and ran every 8 minutes during peak hour. It got students from the town centre to the local university in less than 7 minutes – much faster than the 20 minutes it took with the public buses.

Results

Results
The introduction of trolleybus systems in Castellón has successfully satis ed the di erent requirements of modern and suitable mobility transport issues. These included the cost of implementation, maintenance and operation, and that the system is demand oriented, universally accessible, clean and noiseless.
The trolleybus has exceeded expectations. It is now responsible for more than 25% of all rides on Castellón's public transport network, while private tra c between the university and the city centre has decreased signi cantly. Castellón will extend the system through di erent phases until it reaches 35 km of dedicated infrastructure. The success of the system has encouraged the Valencian authorities to implement it in other middle-sized cities: similar systems are undergoing planning in Sagunto and Elda, and city authorities are modelling the former planned tramway line between Alicante and San Juan and Muchamiel on a Castellón-like system.

Sources

Moncholí i Badillo, David and Tadej Brezina, “Reintroduction of trolleybus systems in Spain,” Determinants of functioning of trolleybus transport in selected cities of the European Union (2011)

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More Information

Implementing Partners

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