



urban mobility solutions  
Urban, Electric Mobility Initiative

# actsheet

## Electric and Hybrid Public Transport



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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 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.

**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.

# UEMI

## Solutions

## Aims

## **In brief**

Transport contributes to around 22% of global greenhouse gas (GHG) emissions, and this figure is increasing dramatically 2.1% per year. To reverse this trend and reduce local air pollution, road-based public transport needs to shift from conventionally fueled vehicles (petrol and diesel) to alternatives such as electric or hybrid electric vehicles, or those fueled by natural gas. Making this shift can significantly reduce greenhouse gases and local air pollution.

## **Examples**

Buses can use energy in two ways; they can either store the electricity onboard in batteries or hydrogen-powered fuel cells, or receive energy from overhead lines or third rails as trolley buses, metros, trams and trains do. While battery electric buses are currently operating in several cities, hybrid buses are becoming more common in smart cities.

Today, many big urban hubs rely on electric, and hybrid buses. In Europe, Luxembourg and Italy in particular are forerunners in introducing this technology. BEVs (battery or blade electric vehicles), PHEVs (parallel hybrid electric vehicles) and CHEVs (complex hybrid electric vehicles) are present in many public transport systems, such as Beijing (China) or New York (USA).

## **Results**

Replacing conventionally fueled vehicles with clean technology brings several benefits for both passengers and the environment. Electric vehicles are more comfortable for passengers because they do not vibrate or make noise as much as regular buses. Moreover, new vehicles with innovative technologies can also have a positive impact on the image of public transport.

Citizens will also benefit from cleaner and quieter roads. Using electric or hybrid vehicles in public transport can also have a great impact in the business model of the private sector, and their large-scale deployment in public transport system will help any city achieve its climate change mitigation targets.

# In brief

# Examples

# Results

## Technical and Financial considerations

Introducing electric and hybrid vehicles in public transport requires new and costly infrastructure. As the routes for public transport are pre-determined, cities need to introduce electric charging stations along these corridors. However, this is an advantage in terms of costs because as the route is already known there will be fewer charging stations.

Even if investment costs appear to be very high, cities can recover them in the long term by the reduced fuel consumption. The cost of an electric or hybrid bus is higher than a diesel bus due to the cost of the batteries. Even if this price tends to decrease year after year, it is still more expensive than diesel alternatives, which could present a barrier for small cities that do not benefit from private initiatives or strong political will.

Therefore, even though the economic investment needed for BEVs or HEVs seems high, the positive impact on citizens and the environment outweighs the negatives.

## Policy/legislation

Obliging a city to have a Sustainable Urban Mobility Plan (SUMP) has proven to be one of the ideal legal frameworks. By developing a SUMP, cities need to establish clear short-, medium- and long-term targets, such as encouraging citizens to use more sustainable forms of transport; improving accessibility; reducing greenhouse gases; cutting travel times and congestion on public transport; improving the delivery of services and freight; and identifying transport infrastructure priorities in the near future.

Deploying clean vehicles for public transport should be part of an integral city strategy for clean vehicles in terms of refueling or charging infrastructure. Measures such as low-emission zones can prompt the public transport sector to replace vehicles with cleaner alternatives.

Ideally, the local administration manages and supports the installation of charging or refueling infrastructure. In terms of the institutional framework, best practices clearly show the need to have a single transport agency within a city that plans, manages and controls the different transport modes and its quality of service standards.

# Technical and financial considerations

## Policy/Legislation

## **Institutions**

Leading institutions that promote BEVs and HEVs 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 different entities involved in different sectors, such as the environment, urban development, public space, economic development and social communication; the secretary of state (or related local agency); and the financing agency.

## **Transferability**

The transferability highly depends on whether current fuel and electricity prices strongly influence the cost-effectiveness of hybrid or electric buses, and whether the performance of electric vehicles compared to conventional ones (in terms of energy efficiency) can be affected by routing, driving style, temperature and traffic conditions.

Some cities might benefit from local conditions while other may suffer from them. However, reducing air pollutants is independent from the location and thus transferable across cities and countries. Many cities worldwide have successfully replaced diesel buses with BEVs or HEVs such as Shanghai (China), London (UK), Bogotá (Colombia) and many more.

## **Case study: Hangzhou (China)**

### **Context**

Hangzhou, in China, has about six million inhabitants. The city encourages non-motorised transport, part of the reason why it has the largest bike sharing system in the world with 70,000 bikes and 3,000 stations. Some 66% of trips are by non-motorised modes.

In 2005, Hangzhou began introducing electric and hybrid vehicles. However, in the years that followed Hangzhou experienced a rapid motorisation, registering over 2 million vehicles in 2014. As a result, air pollution increased at an alarming rate. Since 2010, the city has been looking at alternative environmental strategies to tackle this problem.

### **In action**

In September 2014, Hangzhou ordered 2,000 all-electric buses and today there are more than 1,500 clean

# Institutions

## Transferability

## Case Study: Hangzhou (China)

buses circulating the city, around 21% of the bus feet. The city also introduced electric taxis, with 500 of them currently in service in Hangzhou, traveling an average of 230 km per day. This impressive distance is due to the city installing a high number of battery-swapping stations throughout the city, where taxi drivers can quickly change batteries instead of charging them - eliminating long waits. China State Grid, the electricity provider, own the batteries and also act the charging station operator. This reduces the extra costs of electric vehicles for private or public investors.

## Results

Hangzhou has been facing a big challenge in reducing carbon and energy consumption for several years now. Public policies are focused on implementing and improving sustainable transport such as public transport, walking and cycling, and new energy vehicles. Electric vehicle programs have made Hangzhou one of the leading cities in developing low carbon transport in China. The transport authorities, in collaboration with the local automobile industry, promote new energy vehicles (BEVs and HEVs) and public charging services.

However, the city still needs to solve a number of issues. The huge variety of sustainable transport modes and vehicles makes the coordination and integration between them problematic.

Due to the use of electric and hybrid buses, Hangzhou reduced the local air pollution attributed to public transport in the city. According to city officials, the use of alternative fuels has also contributed significantly to reducing GNG emissions.

## Sources

Banister, David and Liu Jian, Urban Transport and the Environment, Hangzhou, China, (2 (2011)

# Results



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