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# -Mobility Solutions

## Managing Electric Two-Wheelers



**Wuppertal  
Institut**

**UN HABITAT**  
FOR A BETTER URBAN FUTURE



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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.

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## In brief

**Electric two-wheelers**, such as motorcycles, scooters, pedelecs (pedal-assisted electric bikes) and mopeds, have many positive characteristics compared to their petrol equivalents. In particular, they produce less air pollution and CO2 emissions, and less noise. Also, two-wheelers, when they are used instead of cars, improve overall safety in the city and can increase the mobility of low-income citizens. Smart use of measures can foster an increase the share of electric two-wheelers in a city amid growing overall numbers of petrol-powered two-wheelers (PTWs).

## Examples

**Electric two-wheelers** are popular in many Chinese cities, in many cases driven by outright bans on their fossil-fuelled equivalents. Murcia (Spain) installed public charging stations for electric two-wheelers to encourage the deployment of electric motorcycles and electric bikes (Eltis, 2012). As part of the CIVITAS Initiative, Rome (Italy) introduced about 400 electric scooters and suitable recharging infrastructure. In addition, Rotterdam (Netherlands) and Barcelona (Spain) installed charging infrastructure for electric scooters and bicycles – and the latter launched the first electric scooter-sharing project in 2013. Naples (Italy) promoted electric two-wheelers by cooperating with manufacturers to offer discounts for electric scooters and pedelecs (Edegger et al. 2012).

To help replace fossil-fuelled two-wheelers (or passenger cars) with electric two-wheelers, cities can write a plan with appropriate goals based on an examination of the role and implications of electric two-wheelers in the entire local transport system. Measures in the plan could include banning non-electric powered two-wheelers (PTWs), providing dedicated parking, creating charging areas and separate lanes for electric two-wheelers, and special waiting areas at intersections for motorcycles, or excluding electric two-wheelers from city tolls.

## In brief

## Examples

## Results

**Conventional two-wheelers** contribute substantially to pollution in cities. When switching from conventional to electric two-wheelers emission of hydrocarbons and carbon monoxide can be largely avoided.

Promoting electric two-wheelers can help raise awareness and change the behaviour of citizens and tourists in favour of using more sustainable forms of transport. Electric two-wheelers provide a more affordable, and more sustainable, alternative to fossil-fuelled cars, especially for low- and middle income groups.

### Technical and financial considerations

In contrast to electric cars, charging electric two-wheelers is relatively easy and requires less infrastructure, and to date a number of small projects have demonstrated that there is potential for electric two-wheelers (in China they are gaining popularity). However, in many cities their benefits are diminished because of insufficient regulations and enforcement, and because they are not integrated properly within the transport system. In addition, cities should develop or improve charging infrastructure and guarantee charging sites.

Increasing the amount of energy that batteries can store is important in allowing electric two-wheelers to travel further distances between charges, although less so than for electric cars. Regulations should be implemented to enforce the use of sustainable lithium batteries instead of the cheaper, short-life sealed lead acid (SLA) batteries. Technological improvements are also necessary to improve the affordability of electric two-wheelers.

Electric bicycles have the potential to cause accidents due to their higher speeds (for unaccustomed riders) and traffic regulations and infrastructure not designed with them in mind. Similarly, as they also have no turn indicators or horn and are noiseless, are further points of accident potential.

In the past, some cities have implemented isolated measures regarding electric two-wheelers such as an integrated citywide electric two-wheeler plan. Improving the regulation of their use can reduce safety issues. Kuala Lumpur (Malaysia) and Taipei (Taiwan) have reduced accidents by introducing motorcycle lanes and waiting boxes at junctions (Hook and Fabian, 2009).

## Results

### Technical & financial considerations

## Policy/legislation

Subsidies for electric two-wheelers can stimulate their sale. Governments also should provide the right incentives for private investors to research and develop electric two-wheelers. Recharging and driving distance remains a technological challenge which the industry needs to tackle.

In China, the 2004 law on Road Traffic Safety defines electric bicycles and scooters as non-motorised vehicles and imposes a speed limit on them of 15 km/h. However, it is easy to exceed this speed limit by 5-20 km/h unconsciously, which poses significant danger.

China's example shows the need for strict regulations from the beginning to avoid accidents and unintended unlawful behaviour. Other considerations include prohibiting the sale of SLA batteries, requiring the registration of electric two-wheelers, implementing recycling regulations, and adapting infrastructure (for example, creating special lanes for electric two-wheelers).

## Transferability

**Electric two-wheelers face the same challenges** and have the same benefits for most urban areas. Travel is increasing in cities, and with that typically comes increased congestion, discouraging people from using buses. Where private transport is favoured, two-wheelers provide a sensible alternative to cars, albeit with many negative side-effects (e.g. air pollution and noise). Electric two-wheelers mitigate many of those negative effects, and can be charged with standard electrical outlets, avoiding the need for new and dedicated infrastructure.

## Policy/legislation

## Transferability

## Context

**China is the world's largest electric two-wheeler** manufacturer and exporter, and the country with the highest number of electric two-wheelers. The national government is responsible for type approval of vehicles, and thus for defining what counts as a bicycle and what as a motorcycle.

As of 20.064, bikes with “functioning pedals” are classed as pedelecs, with the result that essentially electric scooters are classed as bicycles, and are subject to the same rules and limitations. Furthermore, many of the regulations are ‘recommended’, or easily circumvented (e.g. easy-to-remove speed limiters), which has led to some problems.

## In action

**While the Chinese national government** is responsible for type approval, the cities have power over how the standards are enforced and over traffic management. In 1996, in response to air quality problems and excessive car use, Shanghai banned the sale of petrol-powered scooters, and as of 2006 only two-wheeled vehicles allowed to be sold in Shanghai are LPG, electric or only- human powered.

The ill-defined regulations regarding power output, maximum speed, licensing requirements, safety equipment (lights, indicators etc.) governing electric two wheelers has led to safety problems, and led to Shanghai banning some types in 20165.

In addition, the solid waste from electric two-wheelers is considerable higher than conventional bikes and scooters, mostly from battery disposal. While electric two-wheelers do not have a dedicated infrastructure they have to either compete with cars or bicycles and pedestrians. Both can lead to an increase of accidents. While cars can move more people, electric two-wheelers are mostly only providing mobility for one or two persons. This leads to an increase in two-wheelers in the street and can have a negative effect on congestion in cities.

# Case Study: Shanghai (China)

## Results

Figure 1, below, shows the result of the petrol-scooter ban on the type of two-wheelers present in Shanghai; a sharp increase in the numbers of e-bikes and bikes. Figure 2 shows the difference in modal share between Shanghai and Chengdu (both electric two wheeler friendly, Chengdu without LPG infrastructure) and Beijing, which is hostile to electric two wheelers, and, as expected, has a lower share of e-bike use.

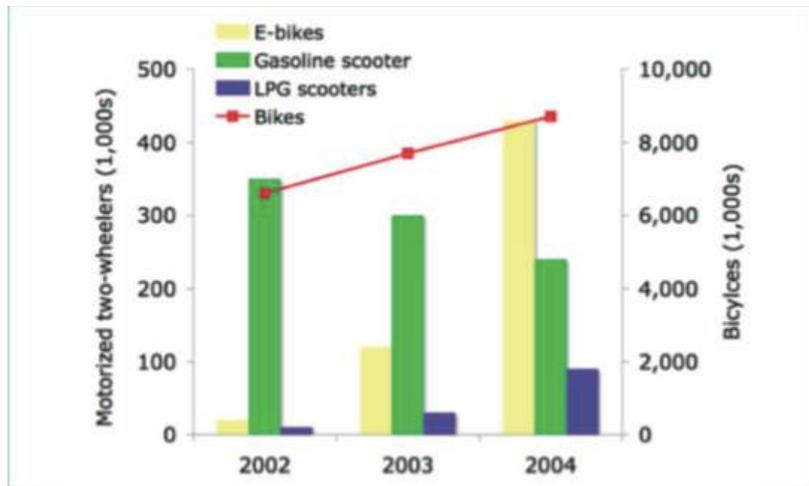


Figure 1. Effect of Shanghai's ban on petrol-powered two-wheelers.

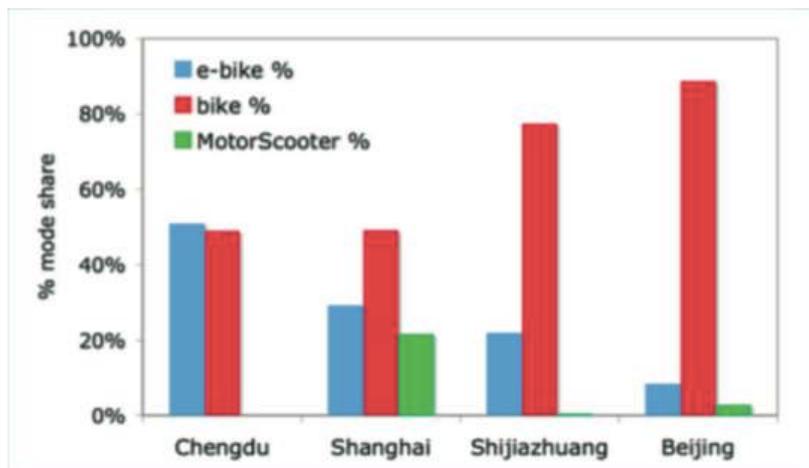


Figure 2. Comparison of modal share between cities friendly (Shanghai, Chengdu), hostile (Beijing) and neutral (Shijiazhuang) to electric two wheelers.

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# Results

## References



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