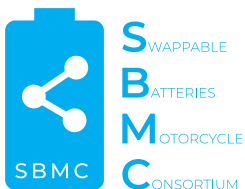


Key advantages of **swappable batteries** **for cities**

October 2023



**Swappable Batteries
Motorcycle Consortium**
A common standard to boost
sustainable urban mobility

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about SBMC

The Swappable Batteries Motorcycle Consortium (SBMC), founded in September 2021 by KTM, Honda, Piaggio and Yamaha, has quickly grown to about 40 members. The motorcycle industry clearly understands that electromobility will play a key role in the future transport of people and goods. By working together on common battery specifications, this will allow and enable the introduction of swappable battery stations in an efficient and cost-effective way.

With this Consortium, the members aim to facilitate the use of electric lightweight-category vehicles by means of swappable batteries and wish to promote the development and deployment of charging infrastructure for that. With lightweight-category vehicles we mean L-category vehicles such as mopeds, scooters, motorcycles, tricycles and quadricycles.

Standardized swappable batteries and battery charging stations allow riders to exchange their vehicle's discharged batteries at battery stations for fully charged ones. Compared to the time for charging their vehicle's battery at a charging point or filling a full tank of gas at a fuel station, standardized swappable battery technology drastically shortens the charging time. This improves user experience, reduces range anxiety and reduces overall cost overheads for end-users. Moreover, it will facilitate the re-use and re-purpose of batteries for a second life, according to a circular economy approach.

SBMC was founded with the mission to accelerate the deployment of swappable battery systems by developing and promoting common technical specifications of the swappable battery systems. These common technical specifications, and their validation through prototyping and testing activities will be proposed as a contribution to feeding the discussions in both European and International Standardization Organisations.



2 Purpose of these **guidelines**

With the amount of people living in urban areas constantly growing, the challenge of improving air quality and reducing carbon emissions becomes more and more prominent. In this context, the European Commission launched the Green Deal, with ambitious objectives for the transport sector to reduce greenhouse emissions. A widely accepted solution to achieve these targets is the electrification of vehicles.

Cities need to create sustainable, efficient, and environmentally friendly urban solutions, it is crucial to adapt to the evolving landscape of mobility.

This guide aims to provide direction to city councils and public entities focused on mobility and environmental matters in integrating disruptive mobility models into their medium and long-term city planning.

According to Nanaki et al. (2017) , **Urban traffic in Europe accounts for 40 % of road transport CO2 emissions and up to 70 % of other pollutants from transport.** Frequent urban congestion of cars contributes significantly to road transport CO2 emissions and other pollutants in Europe. Motorcycles and scooters are well-suited to help alleviate congestion. Noise is also a significant challenge in densely populated urban areas.

- Motorcycles and scooters over short distances are a valid solution, especially for everyday travel in cities.
- Future battery stations make 'recharging' as simple as today is refueling of a motorcycle at a conventional gas station. Charging stations could be located at gas stations, shopping malls, vehicle charging stations and other public places.
- The battery packs available in these stations can be used across different brands and models .

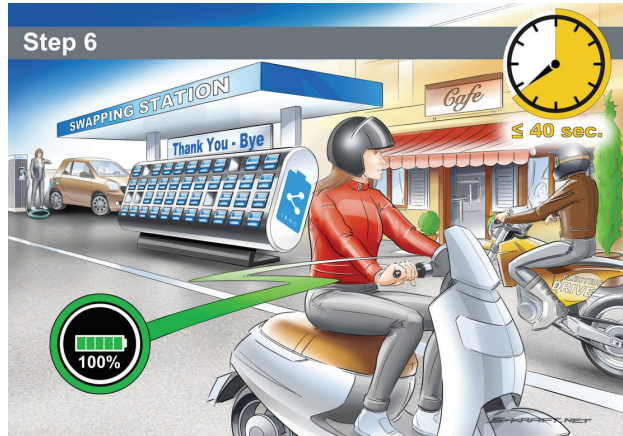
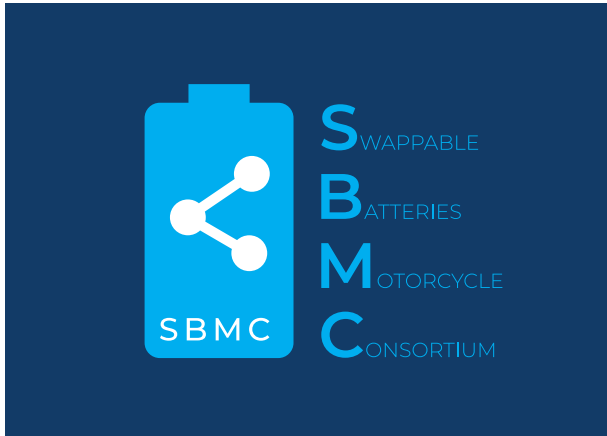
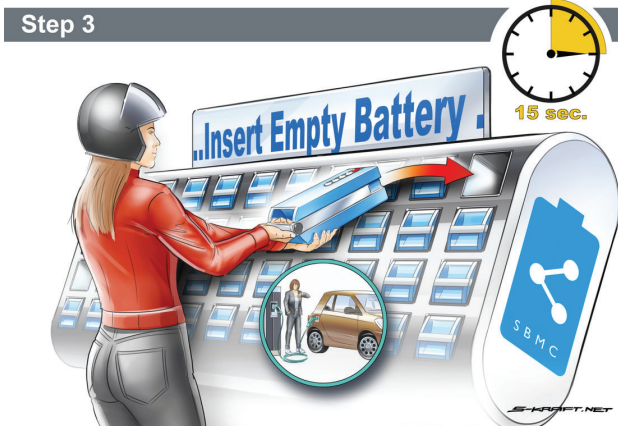
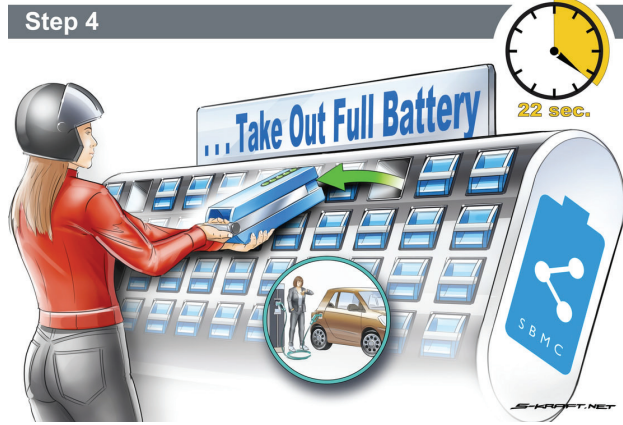
A breakthrough for electric motorcycles in urban areas!

SBMC believes, that the negative public perception of battery range and vehicle performance, which currently make electric vehicles less attractive than conventional internal combustion engines can be overcome with such a widespread interoperable charging infrastructure that meets consumer needs.

¹Nanaki, E.A., Koroneos, C.J., Roset, J., Susca, T., Christensen, T.H., De Gregorio Hurtado, S., Rybka, A., Kopitovic, J., Heidrich, O., & Amparo López-Jiménez, P. (2017). *Environmental assessment of 9 European public bus transportation systems. Sustainable Cities and Society, Vol. 28, pp. 42–52.*



THE CONCEPT



3 The swappable batteries **concept**

Swappable batteries are an innovative solution for electric vehicles. They allow users to exchange their vehicle's batteries at battery stations for fully charged ones, eliminating long charging times and range anxiety. Swappable batteries offer a practical solution to some of the challenges associated with electric vehicle adoption, such as long charging times and range anxiety.

The swappable batteries concept represents a significant advancement in electric mobility, particularly in urban areas. It makes electric light vehicle mobility more accessible, contributing to the reduction of polluting emissions and the decarbonization of transportation. Furthermore, by centralizing battery management and charging procedures within a controlled network of exchange stations, it becomes easier to utilize renewable energy sources for battery charging. This network of exchange stations can also serve as balancing points for energy demand, further facilitating the use of renewable energy and optimizing the electric grid's demand cycles.

Key benefits

- **Enhanced Electrification:** Swappable batteries make it attractive to city residents and businesses by providing quick and convenient refueling options.
- **Reduced Infrastructure Burden:** While infrastructure investment is needed for swapping stations, they can reduce the demand for numerous public charging points, potentially saving on long-term infrastructure costs.
- **Improved Urban Mobility:** Swappable batteries support the growth of clean urban transportation and contribute to reducing emissions, aligning with sustainability goals.
- **Potential for Renewable Energy:** Cities can explore integrating renewable energy sources into swapping stations to further reduce their carbon footprint.



Swappable batteries are an innovative solution for electric vehicles.

4 Why should cities promote the swappable battery concept?

Key advantages of swappable batteries

For customers

- A longer range by simply swapping the battery at a station
- Peace of mind, less range anxiety
- Widespread charging infrastructure
- No worries about battery deterioration during its lifespan: always a good one
- The ease of not having to set up a charging facility at home or at work

For the environment

- Earlier electrification (vs gasoline powered vehicles)
- The efficiency of swapping systems
- Light vehicles contribute to less congestion
- Reduced emissions in urban areas
- Improved re-use / recycling opportunity
- Enhanced circular economy

For manufacturers

- Efficient R&D due to standardization of components
- Quicker time-to-market
- Efficient production, economies of scale
- Increased attractiveness of the product in the eyes of the consumer

For cities

- Swapping stations for light vehicles are very space efficient compared to car charging stations
- The ground occupied by a car, in combination with its recharging time, necessitates wide areas for parking while recharging
- Light vehicles could swap their battery on the spot within minutes, with minimal space occupation
- The station's batteries can be stacked in height and will occupy only a minor area on the ground

Call to action

What can cities do now?

The following measures shall provide some inspiration for cities to foster the adoption of swappable batteries for two-wheelers, improving urban mobility while contributing to sustainability goals and consumer confidence in electric transportation options.

Encourage Consumer Transition – Setting more stringent CO2 objectives can effectively stimulate the electric vehicle market across all vehicle segments, including two-wheelers. Incentivization through subsidies or innovative financing options can support consumers to offset upfront costs.

Infrastructure Development and Management - Encourage the installation of battery swapping stations compatible with standardized batteries, by including such requirements into construction policies. In the framework of the implementation of the European Alternative Fuel Infrastructure Regulation (AFIR), the European Commission called for an European standard containing technical specifications with a unified solution for battery swapping for L category.

Safety and Security - Establishment of specific regulations for the installation of battery swapping stations. Develop differentiated technical and safety criteria compared to traditional charging infrastructure to streamline the implementation of these solutions.

Provide Batteries as a service to citizens - Promote the development of initiatives aimed at offering batteries as a service or subscription, thereby simplifying the charging process (utilizing standardized battery exchange racks). This will support adoption of the BaaS (Battery as a Service) concept enabled by standardized battery systems and charging stations e.g. SBMC.

Call to action

What can cities do now?

Swappable Batteries Motorcycle Consortium

A common
standard to boost
sustainable urban
mobility

www.sb-mc.net

