

# FACTSHEET MADRID



Demonstration City

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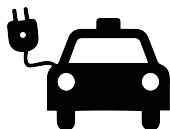
Madrid - Spain

## Demo Description: Cutting-edge technology for smart charging

Given that by the end of 2020, Madrid will have 105 e-buses running in the city, measures to provide adequate and efficient charging will be needed. Five inductive charging points have already been implemented in the city and the buses to be purchased between 2019 and 2020 will have the capability of off-board opportunity charging. Thus, the demonstration will focus on the following measures:

- Testing a software to monitor and control the power network for charging stations and e-buses, maximizing bus availability and operational efficiency.
- Installation of 2 (two) inverted pantographs for opportunity charging with a modular design offering charging power of 90kW, 180kW, 270kW and 360kW, enabling charging times of 3-6 minutes using a low-cost and low-weight interface on the roof of the bus.
- These will be the first inverted pantographs installed in the city of Madrid. Besides increasing the power and thus the speed of each charge, the smart and wireless characteristics of this equipment, will increase the efficiency and safety of the charging process.

An additional component of the pilot will facilitate access to EMT charging infrastructure for taxis and car sharing providers, especially in the city centre by setting an electric mobility hub which will ease the development of business models. This element will be developed subsequently, upon its official presentation.



## Cutting-edge Technology for Smart Charging

Vehicles involved: 5 e-taxis  
10 e-buses

Integration with the PT system: E-buses will be integrated into the EMT operational control system and will operate in a full normal scheme as part of PT offer of the city. Regarding the other type of vehicles (e-taxis, e-charsharing) they will operate freely by using EMT e-mobility hubs

Time span: 2021 - 2022



## Situation analysis

Today EMT has more than 80 e-buses of 5 different brands (Irizar, ByD, Tecnobus, Castrosua Tempus and Wolta). Each brand has its own charger and all of them can charge conductively by wire. These e-buses operate from two different depots, one in the north of the city and the second one in the south. At the moment charging is done by maintenance personnel that plug and unplug each bus. This action is monitored by the same amount of people during the charging period. This procedure is possible because EMT e-fleet is quite small (2% of the total).

The SOLUTIONSplus Madrid demonstration will help to improve the current situation by focusing on two main aspects: interoperability of charging and monitoring. The first one by using inverted pantographs instead of conventional conductive chargers with different plugs. The pilot will be carried out quite likely in Carabanchel bus depot (in the south of Madrid) where EMT has all the propulsion technologies available and sufficient energy supply. A virtual supervision and monitoring system will be installed (smart charging).

Also, EMT will adapt its e-buses with the roof bars and will implement or change their charging communication protocol to be able to charge by pantograph. EMT will add a high power grid connection for the facilities.