

Electric and hybrid electric buses for public transport

Autumn 2018



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- Testing new hybrid electric buses in real-life conditions
- Reduction in emissions by 30%
- Improving public transport service from peripheries to city centre

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 690699.

Location: Madrid, Spain

Organisations involved: [Consortio Regional de Transportes de Madrid](#)

[Municipal Transport Enterprise for Madrid \(EMT\)](#)

What is the solution?

The main objective of the solution is to provide the best possible public transport service using a 'clean' bus fleet in areas which lack high-quality public transport services. The environmental performance and attractiveness of the city of Madrid's public transport service will thus, in general, improve as a result, and be better suited to compete with private car use.

The experience will be used to better know the performance of these types of buses and therefore to help better define Madrid's own strategy on fleet renewal.

This measure is connected to another measure (MAD 5.1) which Madrid is responsible for in the CIVITAS ECCENTRIC project. The measure is about constructing a High-Level Public Service Transport Corridor to increase bus use from one of Madrid's peripheries (the ECCENTRIC 'living lab' - which includes two south-eastern districts - Puente de Vallecas and Villa de Vallecas) to the centre of the city.

The measure is consistent with the Air Quality Plan and the actions of Madrid's Sustainable Urban Mobility Plan (SUMP). It is also aligned with EMT's strategic plans regarding clean fleet uptake.

How does it work?

The measure will introduce at least six new fully electric or hybrid electric buses to Madrid's existing bus fleet and will test them in real-life conditions in the city's living lab. An analysis of public transport service will be undertaken to select the best-suited bus solution. The procurement process will be undertaken, and the new buses will be assigned to serve the pilot public transport corridor. The performance of the buses will be monitored and assessed; this, in turn, will feed into future renewal plans of the city's bus fleet, and produce a set of guidelines for undertaking major fleet renewal in the coming years.

Status as of November 2018: The research and planning phase saw the evaluation of different alternatives for the type of public transport service required in Measure 5.1. Taking into account the length and characteristics of the high-level public transport service corridors in peripheral districts, the conclusion was that the fully electric buses available on the market did not meet the necessary requirements regarding charging infrastructure. Therefore, EMT opted to go with the purchase of hybrid electric-diesel buses. The procurement was done in autumn 2016 and buses were delivered by January 2017. EMT purchased two different makes of hybrid-diesel buses: MAN and IVECO. Testing of these units in real-life conditions is currently being carried out with the new buses being used in Bus Line Number 140, which crosses the demonstration/living lab area. The service began on October 1st, 2018.

Expected results

The expected impacts include a reduction in energy consumption and emissions of 30% (compared to previously used diesel buses which were providing the service before the hybrid buses - based on data from 2017), as well as reductions in noise. Furthermore, it is expected that the new buses will be positively valued by users in terms of attractiveness and comfort, thus increasing their use of the service. Finally, energy savings are expected to result in operational cost savings, compensating the increased capital costs of the new buses.



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Business model

The funds for the procurement of the buses came from Madrid City Council, which in turn transferred the funds to EMT: the Municipal Transport Enterprise for Madrid (in Spanish Empresa Municipal de Transportes de Madrid) - also known as EMT Madrid - is the company responsible for the planning of public urban transport in the city in Madrid.

Timeframe and costs:

The procurement process took nine months from the launch of the tender until the contract was signed with the bus manufacturer. At least two months was needed, prior to launching the procurement, for the internal preparatory work. The total budget of the contract (which included many other buses) was 63.5 million euro. Each one of the ECCENTRIC hybrid buses had a value of 335,000 euro (model MAN Lion Hybrid).

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