

Madrid's Electrification Strategy at EMT

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About EMT



Buses

1.999 buses
211 bus routes
5 depots

967 Diesel
957 GNC
57 Hybrid
18 eBuses (minibuses)



Car Towing

90 cranes
100.000 services/yr



Public Car Park

19 Car Parks
5.000 spaces



Bike Sharing

2.500 ebikes
165 bike stations



9.000 employees

What are doing about electrification?



EMT's Strategic Plan



PLAN ESTRATÉGICO

CERCA

2017 – 2020



Purchase



Infrastructure



E-Buses



Testing Technology



THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
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MADRID



R&D Projects

e-bus purchase

2017-2020: 93 Electric Buses

Electric minibuses (since 2007)



12 m standard (from dec 2017)



18 x Tecnobus 5.2 meter (to be discontinued)
2 central and narrow routes in City Center
27Kw engine
2 x Zebra batteries 85 v and 74 Kw/h
7-8 hour range (70-80 km)
Slow charging at depot

15 x Irizar Ie2 (new) – standard 12m
16 x Zebra Batteries. 376 kw/h, 620 v
180 w Engine
14-16 hour range (148 km tested)
6 hour charge at depot

e-bus depot infrastructure



5 year project

2017-2018: procurement: e-Bus depot **engineering project**

Phase 1: GNC + Electric Depot

Phase 2: Electric Depot for 300 e-buses

2019-2020: procurement: e-Bus depot **construction**
Inverted Pantograph charging (fast charging at night)

Electric vehicle fast charging station (service station)

Testing technology

Inductive Wireless Charging System



5 x Buses to operate the line
(retrofit Hybrid CNG-Electric to Full Electric)
Tempus / Castrosua

Buses equipped with **parking assistance tool**

Batteries: Original Zebra, replaced by **Lithium**
194 cells, 124 kw/h, 620 v

2 headers. **Induction infrastructure:** 2 x
Charging modules 100 KW (400V)

17 round trips per day, **7 km trip each way.**
42 bus stops

Fast induction charge at headers (<8min)
5% - 7% charge = 7 km approximately.

Slow Conductive charge at depot (night)
5 x 22 kw/h – 100 A chargers
3 hour charge

Testing technology

Inductive Wireless Charging System

CHALLENGES

Challenges related to the **civil works** that were undertaken in the city (service impairments, street works taking place making difficult to perform civil works)

Delays on administrative process. No legislation to homologate the buses.

CONCLUSIONS

Service to be started November 2017: **No data yet**

The implementation will allow EMT to verify performance, advantages and drawbacks and assess **feasibility of extending this charging method**

R&D projects



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MADRID



European 48 month project. Started June 2016. **Coordinated by Madrid's City Council.**

5 living labs: TURKU (FINLAND) - STOCKHOLM (SWEDEN) – RUSE (BULGARIA) – MADRID (SPAIN)

Total 8 partners

ECCENTRIC

*This project focuses on **sustainable mobility in suburban districts** and innovative urban freight logistics, two important areas that have previously received less attention in urban mobility policies.*

MADRID DEMO

*In the Madrid demo, the objective is to provide the best possible service with the cleanest bus fleet in areas that are suffering lack of high-quality Public Transport offer, with a **High Level Public Transport service corridors** in peripheral districts in Madrid City*

MADRID's lab



Expected outcome:

- A 3 km BRT corridor along the demo area
- Reorganization of existing routes to accommodate to the new high level of service corridor
- Operated with **Electric** or **Hybrid buses**

Goals:

- **Increase number of bus passengers**
- Increase in commercial speed (10% reaching over **13 km/h**)
- Increase regularity levels (by 9% reaching an average of **94%**)
- Increase Public Transport **acceptance**
- Contribute to the city level objective of **increasing modal share** for PT by 4%
- **Contribute to the Air Quality** Plan Objectives to reduce emission levels and improve air quality

THANK YOU

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