

Diesel bus' fleet modification into electro powered





Global problem at aged urban transport fleets operation: low efficiency and high pollution. Same time fleet operators are interested in the extension of buses life-cycle. Some have a desire to modify the part of bus fleet into the environmentally friendly condition.



We offer a solution that will ensure the fulfillment of two objectives: Prolongation of used vehicle's life cycle and ecology environment improvement by means of conventional diesel bus' fleet modification into electro powered.

Battery Electro Buses (BEB) currently manufactured in the EU, USA and China are still of very high price. We set the goal to significantly reduce the initial capital cost of electric bus. Estimated ready to go e-bus is about EUR 250 000-260 000. While current price of analogues is EUR 350 000 and above.



The relatively low cost of the modified vehicle is planned to be achieved through :

1. The use of the platform (chassis + body) of existing vehicle with high depreciation level and in technically good condition.
2. Engineering and technological solutions of vehicle modification with low labor and money expenses.
3. Clever selection of electric power train and battery.
4. Electrobus's system optimal setting up according to the particular route data and traffic schedule.

Implementation of CCS – Public Transport



Battery concepts for 12m electric city buses



Small battery (~85 kWh)

- Fully charged at bus stops with high power (400-500 kW).
- Fully charged over night with low power (20 kW).



Large battery (>200 kWh)

- Recharged with medium power at final stops (50-100 kW).
- Fully charged over night in the bus depot.

Both battery charging concepts require a power range of 20-100 kW

The choice of method of batteries charging is the key point for charging infrastructure constructing, as well as for the hardware configuration and operating expenses. At the same time, the choice of charging method determines the type and characteristics of the battery mounted on the BEB.

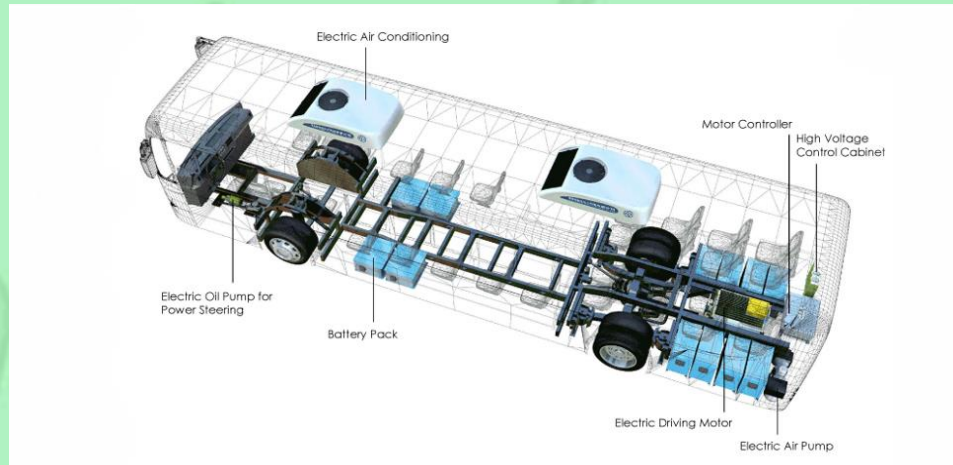
Cost of an BEB can be significantly decreased by reducing the battery capacity (size). This case the fast on-route charging is necessary. BEB charging on-route are designed to meet a limited distance on one charge but unlimited during day time.

Table 13: Battery weight and volume as a function of battery size

	On-route	Overnight
Battery Size	50 kWh	250 kWh
Battery Weight @ 100 Wh/kg	500 kg	2500 kg
Battery Volume @ 200 Wh/l	0.25 m ³	1.25 m ³

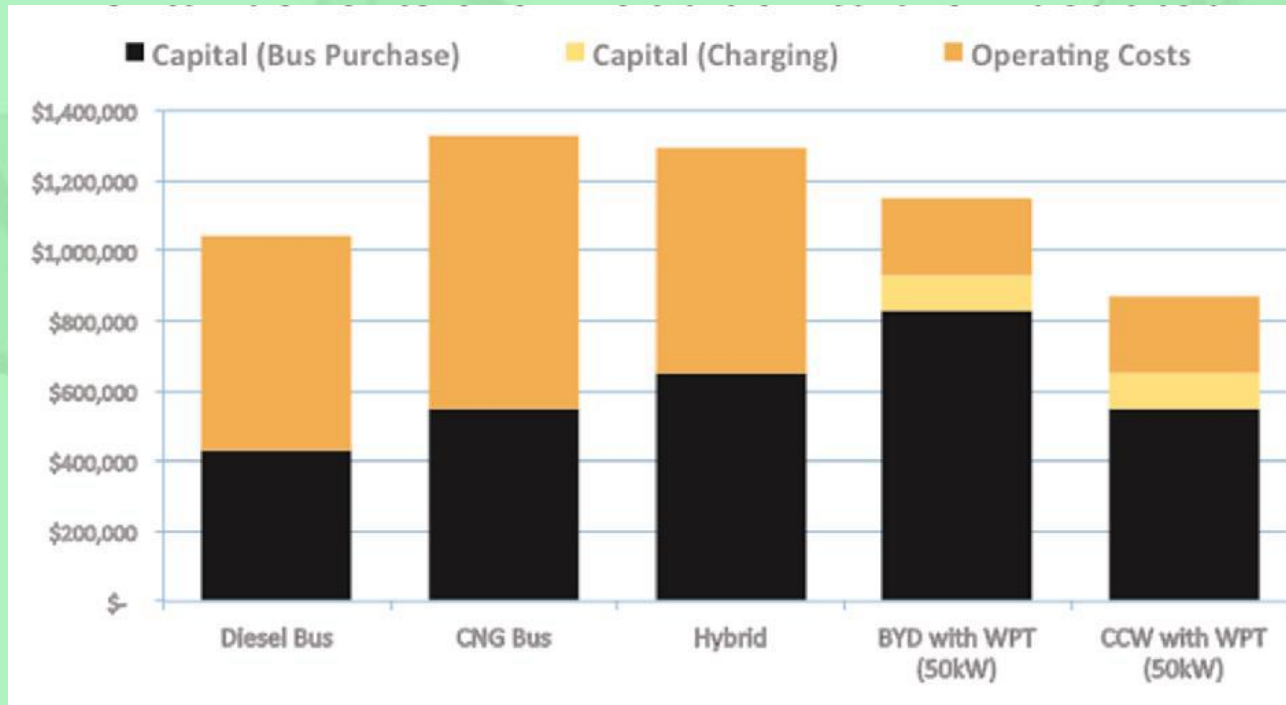
With identical battery energy densities, the electric transit bus charging on-route has a much lighter and smaller battery pack compared to the electric transit bus charging overnight.

Estimated technical data of the electro bus with fast charge technology:



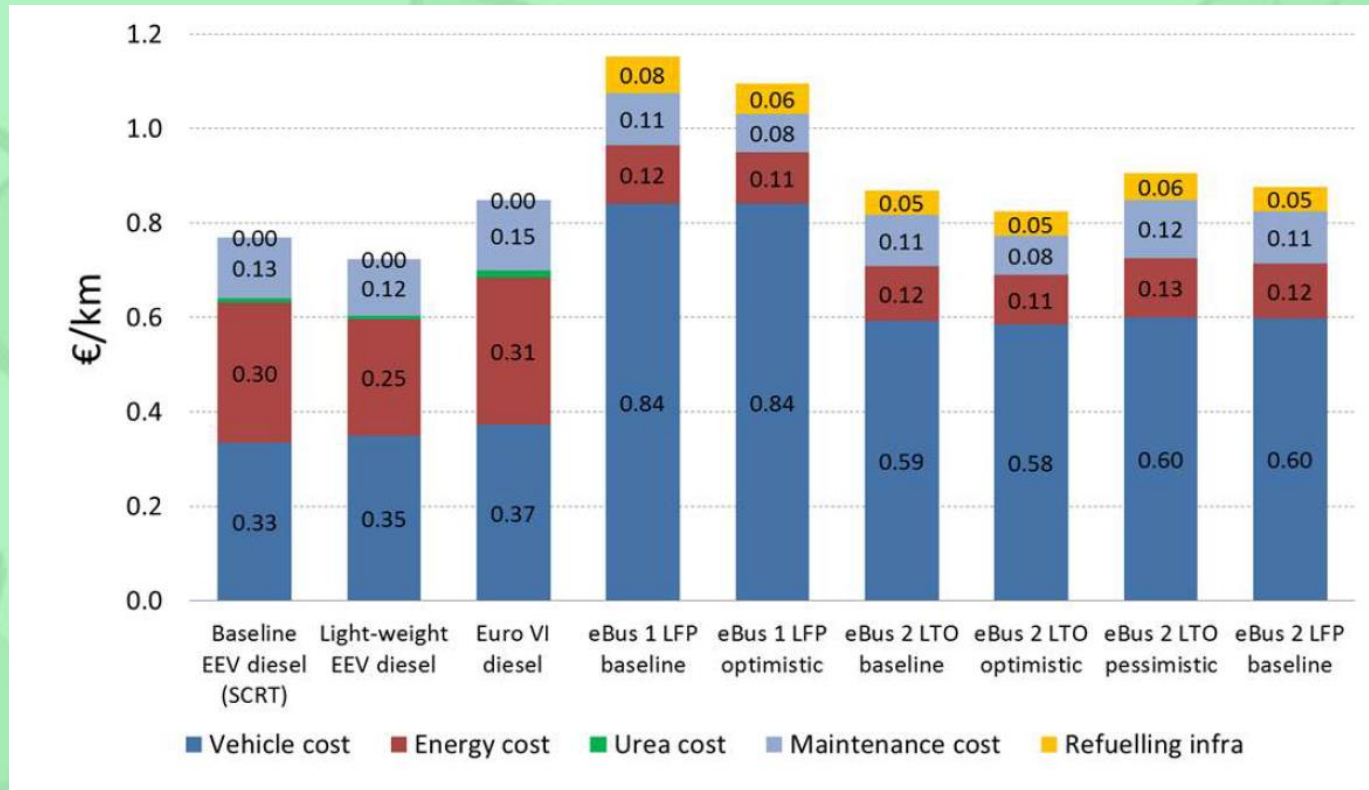
	Slow charge	Fast charge
Empty weight of the 12m long BEB vehicle	11,5-14 t	10-12 t
Full loaded mass (GWV)	16-19 t	14-17 t
Passenger capacity	65-75	60-75
Battery capacity	220-250 kWh	60-85 kWh
Run on one charge	app. 150 km	30-50 km
Charging time on depot	5-7 h	
Charging time on route final stop		5-15 min

The cost of ownership (CTO), in most cases now still exceed the CTO of the traditional diesel buses.



Source: Wave report «All electric airport shuttle buses», May 2015

Cost of ownership (TCO) based on 1 km run for different types of batteries [2].



Thank you for attention!



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