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Power of Enthusiasm





Tender requirements and preferences.

Can trolleybus defeat diesel bus in a procurement procedure?



Customer expectations behind the new requirements :

1. Possibility to drive without overhead network
 - Flexibility to drive in old towns, city centers, green zones, ect – where there is no overhead network,
 - Emergency driving in case of construction work or overhead network malfunction
2. Improved driver comfort (standard solutions)
3. Improved passengers comfort and safety
4. Reduction of overall costs (energy consumption, maintenance)
5. BRT look – metro style
6. Higher reliability and durability
7. Faster and more efficient service support

New tender requirements :

1. APU (diesel generator or battery)
2. Automatic current collectors
3. Dedicated HVAC for driver
4. Various types of driver cabins
5. Standardized driver place
6. Dedicated HVAC system for passengers
7. Isolation monitoring devices in relation to double isolation
8. Energy consumption (test results, supercaps)
9. Remote diagnostic
10. BRT look – metro style

Problems with the new requirements :

APU (diesel generator or battery – sizing

- dynamic requirements for diesel generators no described in details
- missing route profiles for battery selection

Current collector and collector shoe description

- missing detailed description of infrastructure

Various types of driver cabins

- not enough details of driver cabin

Standardized driver place

- does not make easy to implement more and more new functions of trolleybus

Isolation monitoring devices

- missing detailed description about operation requirements

Energy consumption

- test specifications and way of measurement

Remote diagnostic

- only very overall description of customer expectations (difficult to compare proposed systems)

BRT look

- details of how BRT shall look like to meet the customer requirements)

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EU Directive 2009 / 33

Emission costs :

CO ₂	0,03	€/ kg
NO _x	0,44	€/ g
PM	8,7	€/ g
NMHC	0,1	€/ g

Assuming :

- 12m meter bus with Euro 5 engine
- making 60 000 km per year in 16 years (960 000 km)

Cost of bus emissions in comparison with trolleybus + 50 000 € - not enough to cover the difference in trolleybus vs. diesel bus price

But it is not enough to compare only emission costs difference of trolleybus and diesel bus

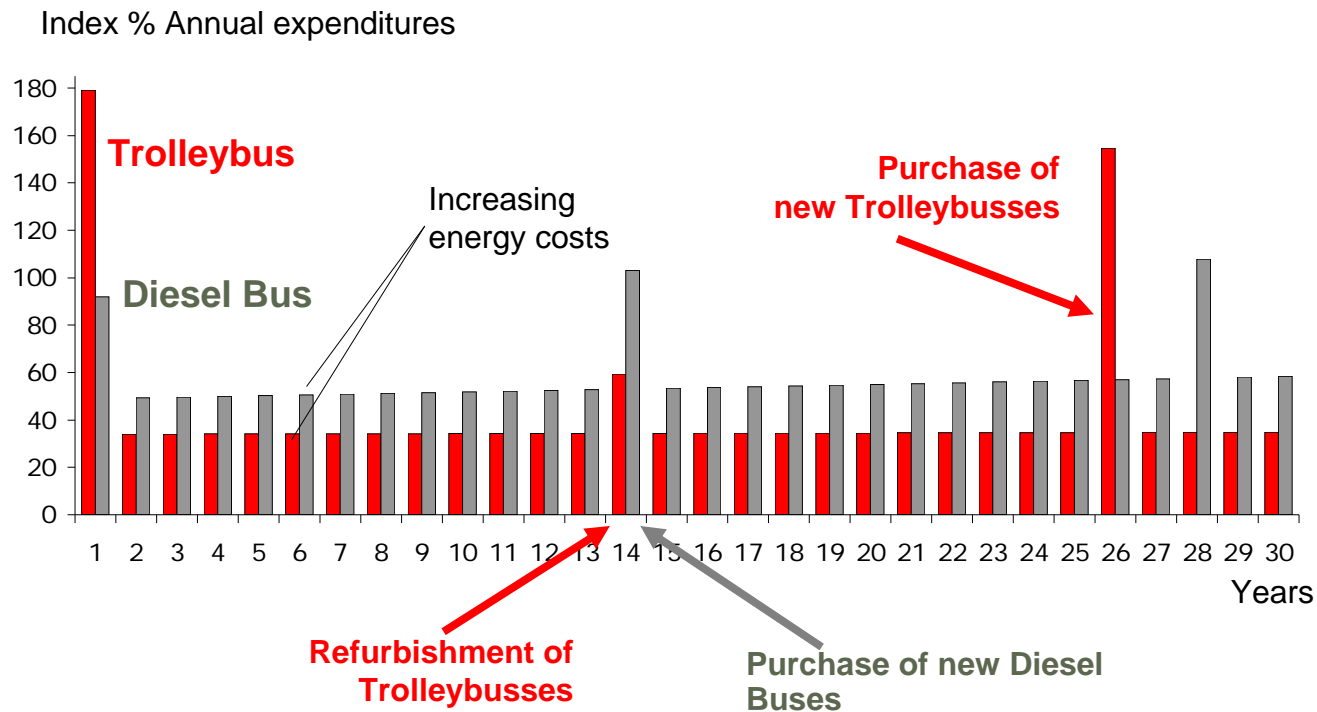
Trolleybus vs diesel bus comparison challenges

	Trolleybus	Bus
Investment	16 or more years	8 -12 years
Infrastructure cost	Overhead network, tools, people	Tools
Operating cost	Electric energy	Diesel oil
Maintenance cost	Vehicle maintenance and infrastructure	Vehicle maintenance
Environmental effect /cost	Zero emission	Emissions
Future cost changes	???	

In standard procurment procedure trolleybus has no chance with diesel bus, even considering EU directive 2009/33

Economic Advantages

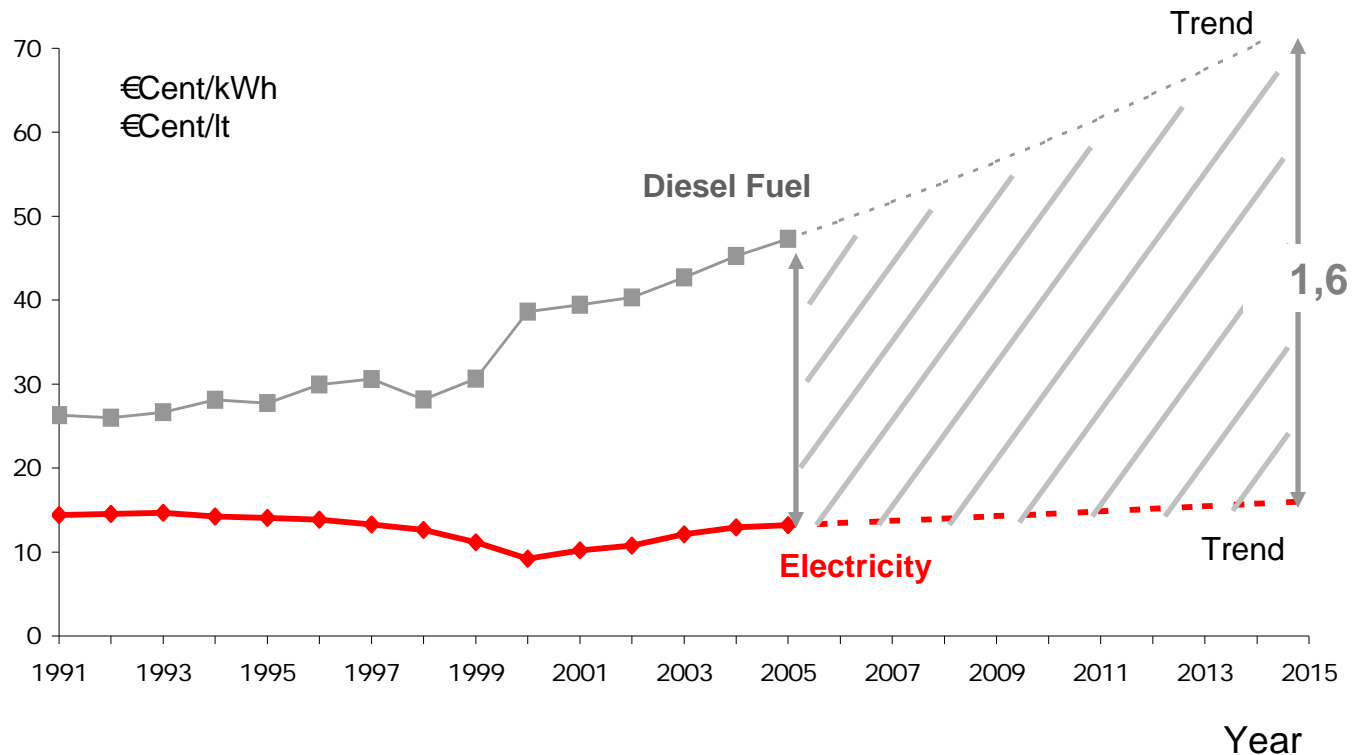
LCC (Life-cycle costs) of diesel bus and trolleybus systems are almost equal



Source: Arnulf Schuchmann. „Trolleybus systems: A business case (investment and operating costs)” presented on the occasion of The UITP Regional Conference Central and Eastern Europe and Eurasia in co-operation with 'GSP Beograd'. Belgrade 27th September 2006

Economic Advantages

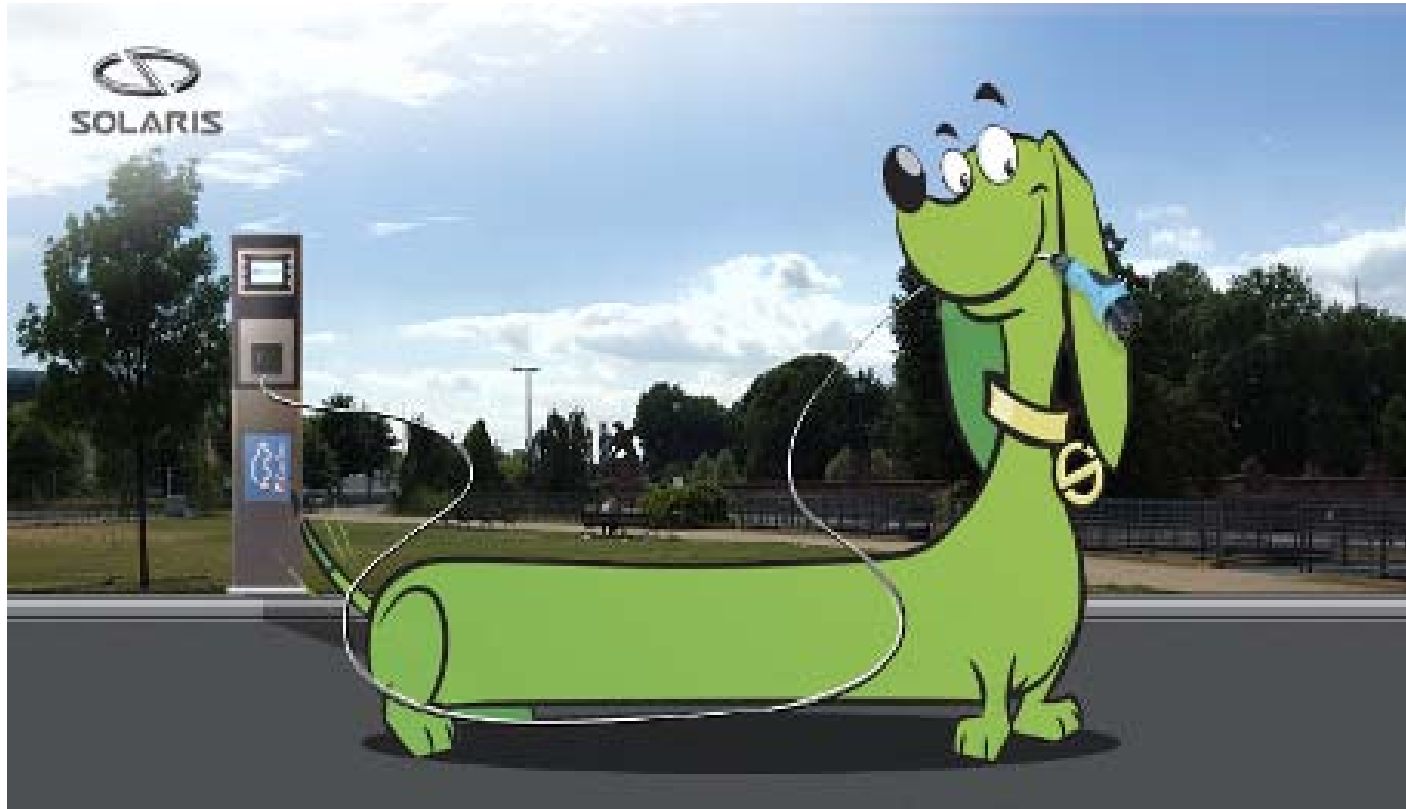
Rise in electricity prices is lower than rise in diesel prices



Salzburg **SVB** operates trolleybuses and diesel buses

Based on SVB comparison and experience :

- Trolleybus in many applications is better solution that diesel bus
- Trolleybus will exist next to diesel bus



Maybe the answer for trolleybus and diesel bus comparison is electric Bus



Thank you for your attention!