

## Title

**Electric bus as public transportation**

## Short description

Electric buses are powered solely by batteries and could be a sustainable and healthier replacement of the natural gas-powered busses. However, there are some costs and logistics problems, for instance, if the bus strands because electricity is out. Nevertheless, a lot of research on this subject is ongoing and may be very valuable in the future.

## Topic

Living – Green spaces

Moving – Active mobility

## Characteristics (type, level)

Neighborhood, Local/Regional, National, EU level Innovation/product.

## Country/Countries of implementation

In Europe Finland, France, Great Britain, Italy, Netherlands, Russia, Spain, Sweden, Switzerland

## Aims and Objectives

An electric bus is a bus powered by electricity as an emission free and less noisy replacement of the normal busses.

## Target Group

Everyone that uses the bus.

## Status

Ongoing

## Start and Completion dates

The idea of electric busses has its origin from electric cars, which arose in the 19th century.

## Lifestyle and Behavior Change

People do not have to change their lifestyle. One unhealthy aspect of their lives (because of emission and noise) is replaced by a less unhealthy aspect.

### Effects on:

<b>Health and Wellbeing</b>	Electric vehicles release no tailpipe air pollutants at the place where they are operated. They also generate less noise pollution and vibration than internal combustion engines.
<b>Vulnerable populations</b>	Social and economically vulnerable people, often use public transportation, are exposed to air pollution. Replacing the vehicles into electric ones mainly targets the people who often use public transport.
<b>Environment</b>	Electric motors are mechanically very simple and often achieve 90% energy conversion efficiency over the full range of speeds and power output and can be precisely controlled. They can also be combined with regenerative braking systems that have the ability to convert movement energy back into stored electricity. The energy efficiency is a factor 3 higher than an internal combustion engine. Energy is not consumed while the vehicle is stationary, unlike internal combustion engines which consume fuel while idling.

### Initiated and/or implemented by

Multiple car manufacturers produce electric cars to provide a sustainable option.

### Stakeholders and sectors involved

Business, mainly car manufacturers and government for instance, for the implementation in the city.

### Financial support

Business, mainly car manufacturers and government

### Evidence-base

- Hu, X., Murgovski, N., Johannesson, L., & Egardt, B. (2013). Energy efficiency analysis of a series plug-in hybrid electric bus with different energy management strategies and battery sizes. *Applied Energy*, 111, 1001-1009.
- Lajunen, A. (2014). Energy consumption and cost-benefit analysis of hybrid and electric city buses. *Transportation Research Part C: Emerging Technologies*, 38, 1-15.
- Lajunen, A., "Improving the Energy Efficiency and Operating Performance of Heavy Vehicles by Powertrain Electrification," Doctoral Dissertation, Aalto University, 2014.

### Main activities

An electric vehicle may be powered by a collector system by electricity from off-vehicle sources or may be self-contained with a battery, solar panels or a generator to convert fuel to electricity.

### Evaluation

A lot of practices, such as the 43 busses in Eindhoven the Netherlands, are not yet evaluated.

### Main results

- Electric city buses have a significant potential to increase energy efficiency and decrease CO2 emissions
- High purchase cost is the main barrier for the electric buses
- Thermal management is a challenge which needs to dedicate research and advanced solutions
- Electric city buses can be more cost efficient than diesel buses already in the near future

### Key success factors and barriers

High purchase cost is the main barrier for the electric buses. Thermal management is a challenge which needs to dedicate research and advanced solutions.

### More information

- Hu, X., Murgovski, N., Johannesson, L., & Egardt, B. (2013). Energy efficiency analysis of a series plug-in hybrid electric bus with different energy management strategies and battery sizes. *Applied Energy*, 111, 1001-1009.
- Lajunen, A. (2014). Energy consumption and cost-benefit analysis of hybrid and electric city buses. *Transportation Research Part C: Emerging Technologies*, 38, 1-15.
- Lajunen, A., "Improving the Energy Efficiency and Operating Performance of Heavy Vehicles by Powertrain Electrification," Doctoral Dissertation, Aalto University, 2014.
- <https://www.thoughtco.com/electric-buses-introduction-2798839>
- [https://www.ecv.fi/@Bin/211333/ECV-seminariesitys\\_10-3-2015\\_Evaluation-of-EBuses\\_Antti-Lajunen.pdf](https://www.ecv.fi/@Bin/211333/ECV-seminariesitys_10-3-2015_Evaluation-of-EBuses_Antti-Lajunen.pdf)

### INHERIT perspective

The electric bus as public transport has been chosen because it brings a healthier and more effective use of energy, availability of transport to all. It has a clear emphasis on behavior, supporting people to leave their car at home, and even walk/bike to the bus stop.

### Contact

<http://www.ev-info.com/>