



## THELMA

This project started in 2010.

# Technology-Centered Electric Mobility Assessment

## Scope of project

Electric mobility technologies have the potential to contribute to the goals of Swiss energy policy which include assuring a more sustainable supply of energy. A detailed, technology-centered system analysis is a prerequisite for understanding the strengths and weaknesses of the options developed, evaluating trade-offs compared to both conventional and other advanced alternatives, and assessing the potential contributions of the technology options to a more sustainable future.

The project addresses automobiles, vans and light trucks. Detailed technology evolution is considered until year 2030 with an outlook until year 2050. The drive trains (electrified and baseline internal combustion engines) and energy carriers (batteries and fuels) are to be combined with various vehicle options (e.g. different vehicle classes, down-weighting, etc.) to define a wide range of vehicles (a «virtual fleet» of designs).

## Goals and activities

The specific goals are:

- To assess LCA-based environmental performance of electric vehicle technologies (in particular, batteries and fuel cells) in comparison with combustion options driven by fossil fuels, biofuels, or hydrogen.
- To account for the role of and requirements on the electric grid depending on the various options for electric mobility.
- To carry out case studies on a regional or local level assessing the environmental implications of the expansion of electric mobility and its integration with the energy supply system.
- To assess aggregated environmental and economic vehicle technology attributes, thus enabling a cost-benefit analysis of electric mobility options both on the technology level as well as for alternative scenarios on the national level.
- To evaluate the relative sustainability of the options by combining their performance on environmental, economic and social criteria with stakeholder preference profiles.

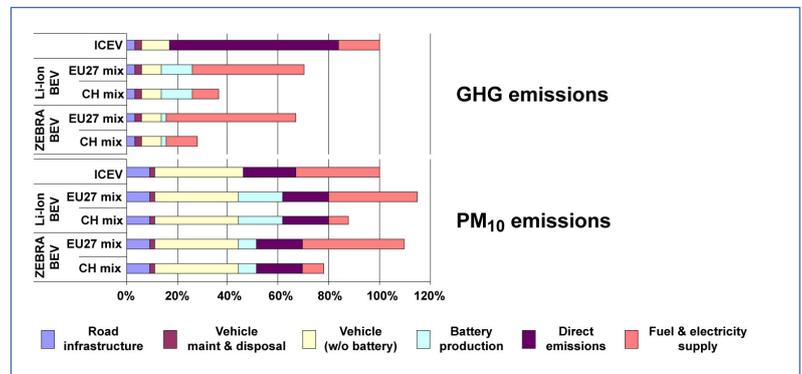


Figure 1: LCA results comparing the environmental performance of ICEV with two types of BEV:

CHmix = electricity mix Switzerland;

EU27 mix = electricity mix European Union 27;

PM10 = particles of 10 micrometers or less.

### Main Investigator

Stefan Hirschberg, PSI

### Project Partners

PSI

ETHZ

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