

Advances and critical aspects in the life-cycle assessment of battery electric cars

Concerns over climate change, air pollution, and oil supply have stimulated the market for battery electric vehicles (BEVs). However, the environmental impacts of BEVs, typically evaluated through life-cycle assessment (LCA), have been discussed critically. On the one hand, BEVs are much more energy efficient and thus form an indispensable component of an energy and mobility transition. BEVs decrease exposure to air pollution as their impacts largely result from vehicle production and electricity generation outside of urban areas. The carbon footprint of BEVs, being highly sensitive to the carbon intensity of the electricity mix, will probably improve in the nearby future through technological progress (more efficient components, changes in battery production) as well as through smart applications (e.g. directed charging, V2G, V2H) and battery second uses.

Impact categories other than the carbon footprint reveal a mixed picture.

LCA is usually based on standardized input data. However, when it comes to passenger car energy consumption and emissions, deviation between laboratory and real world measurements can easily reach a factor of ten. The effects of such deviations on the life-cycle impact comparison of combustion engine and electric vehicles will be discussed.