

Holistic assessment of components & systems for xEV – Life Cycle Assessment (LCA) as a decisive factor in the innovation and development process?

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Abstract

Vehicle manufacturers not only have to comply with current and future CO₂ regulation, they also increasingly commit themselves to a holistic optimization of the automotive life cycle with the aim to become carbon-neutral. This is generating a high pressure for innovation on vehicle manufacturers and the upstream supply chain as well as the demand for a transparent reporting of greenhouse gas emissions.

To offer innovations that contribute to the decarbonization of vehicle manufacturers, suppliers need to integrate life cycle assessment (LCA) into early innovation and development processes to win supplier awards. The holistic technology assessment approach E2P helps to evaluate technology options already in the concept phase and therefore enables comprehensive technology strategies to comply with the changing decision factors in supplier awards.

Two case studies of systems of electric vehicles show how LCA aspects can be taken into account besides economic and performance aspects to support the innovation process.

- An aluminum reference battery case showcases a lightweight potential in the use phase compensating the higher emissions in the production phase against a steel variant in a first case study.
- Enlarging the evaluation dimensions in a second case study by cost and further performance parameters, a high-speed drive-module outperforms the lower-speed reference with better cost, power-density, and emissions despite slightly worse cycle efficiency.

The comparison of the two case studies proves the necessity of a holistic technology assessment to get a clear decision basis.