eFuel Alliance

information brochure

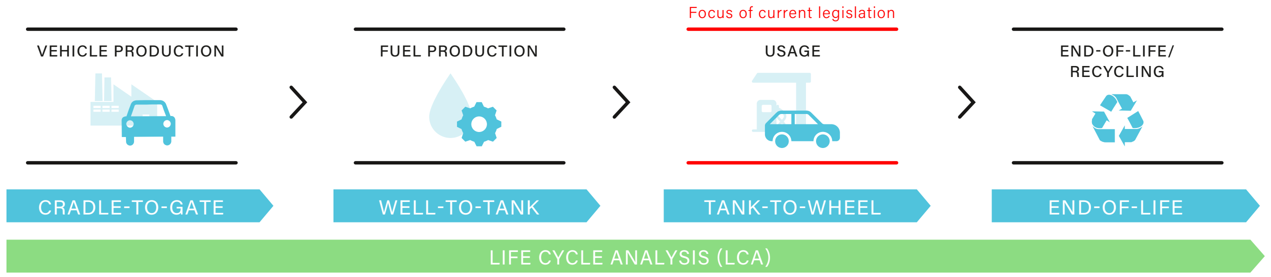
CO_2 emissions in the passenger car/LCV segment – current study results

Methodology of the study

To determine the total balance of CO_2 emissions in the present studies for battery electric vehicles (BEV) and internal combustion engine vehicles (ICEV), the LCA approach (Life Cycle Assessment) is used. The associated LCA calculation tool allows variations of significantly influential parameters on the CO_2 overall balance, such as vehicle segment, battery capacity, utilisation period, electricity generation1) and fuel mix (including prospective eFuels admixtures[2)]), as well as country of manufacture and operating country.

Four key findings from the LCA analyses

For a comprehensive overview, it is recommended that one view the study itself or use the underlying calculation tool for one's own parameter variations. LCA provides information about the real CO_2 balances and only then enables reliable system comparisons.



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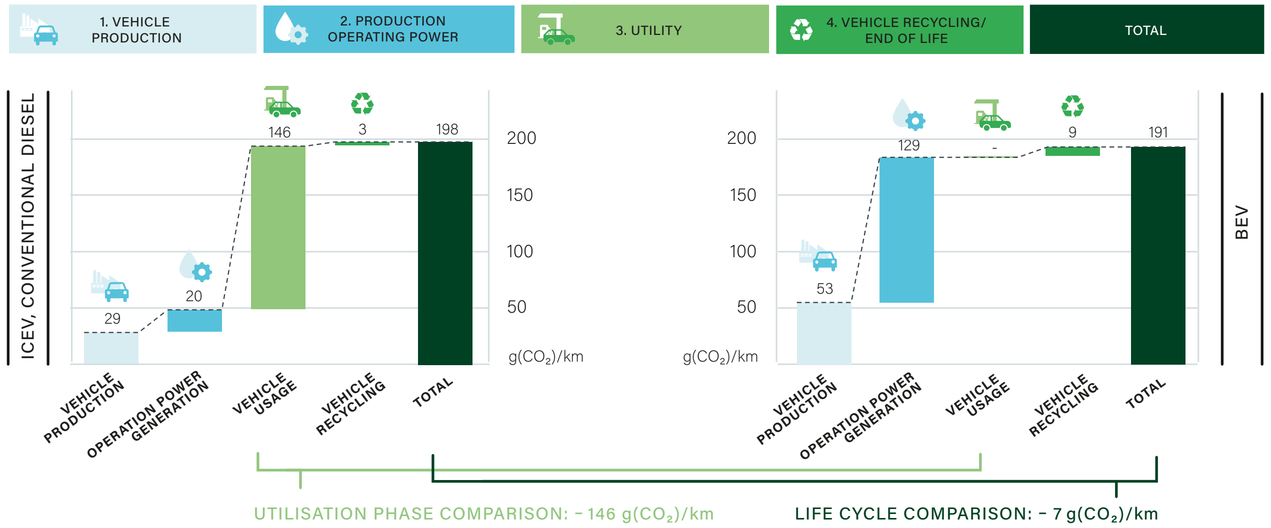
Finding 1

"Tank-to-Wheel" This accounting system is in widespread use in currently applicable legal regulations. However, it does not represent the real CO_2 emissions balance. A system comparison of drive technologies on this basis is misleading.

"LCA Approach" This system approach accounts for CO_2 emissions over the entire life cycle of the drive technology and thus represents real CO_2 emissions. The LCA approach is not taken into account in current legal regulations although it would be justified.

Finding 2

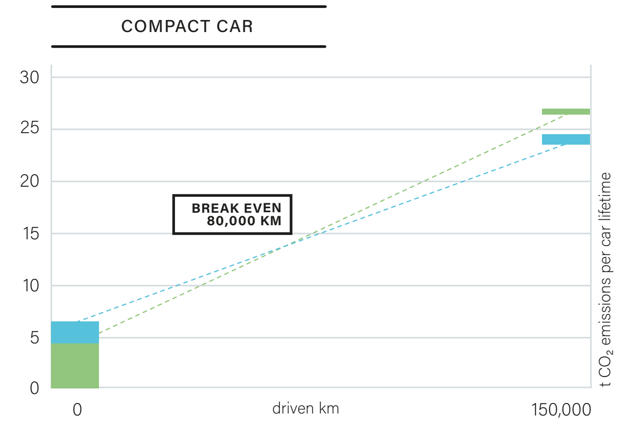
CO_2 emissions vary in the individual life cycle phases: for BEVs, primarily in production and propulsion energy; for ICEVs in the utilisation phase. The accumulated CO_2 emissions over the overall life cycle for BEVs and ICEVs are relatively close to each other (example picture mid-size passenger vehicle within a standard set of practical parameters[3)]). A system comparison restricted to vehicle use would lead to inaccurate conclusions.

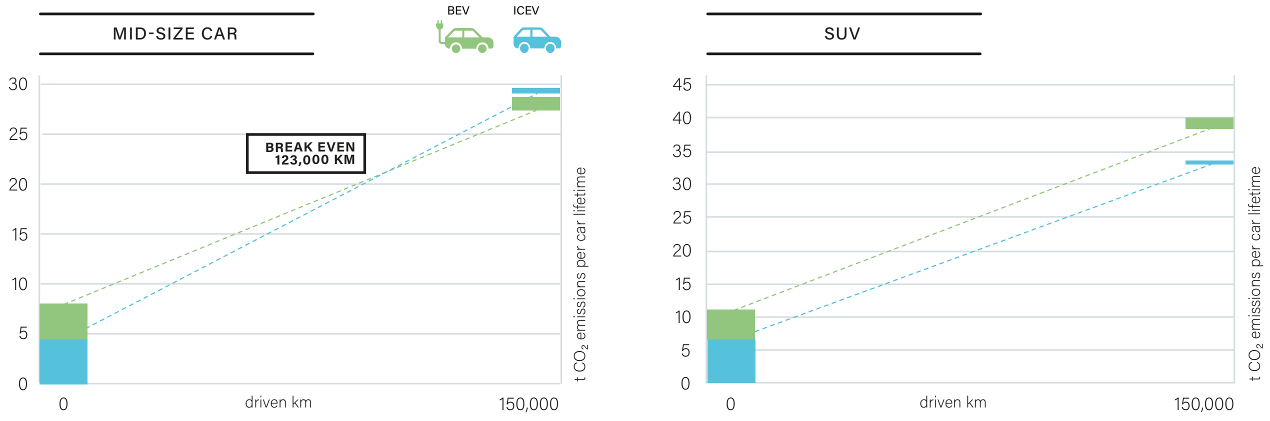


Finding 3

Which technology is more beneficial over the complete life cycle with regard to their CO_2 emissions depends on several parameters. For the selected parameter set[3)], for example, the compact car requires a mileage of 80,000 km before the BEV becomes advantageous over the ICEV (graphic: break even point).

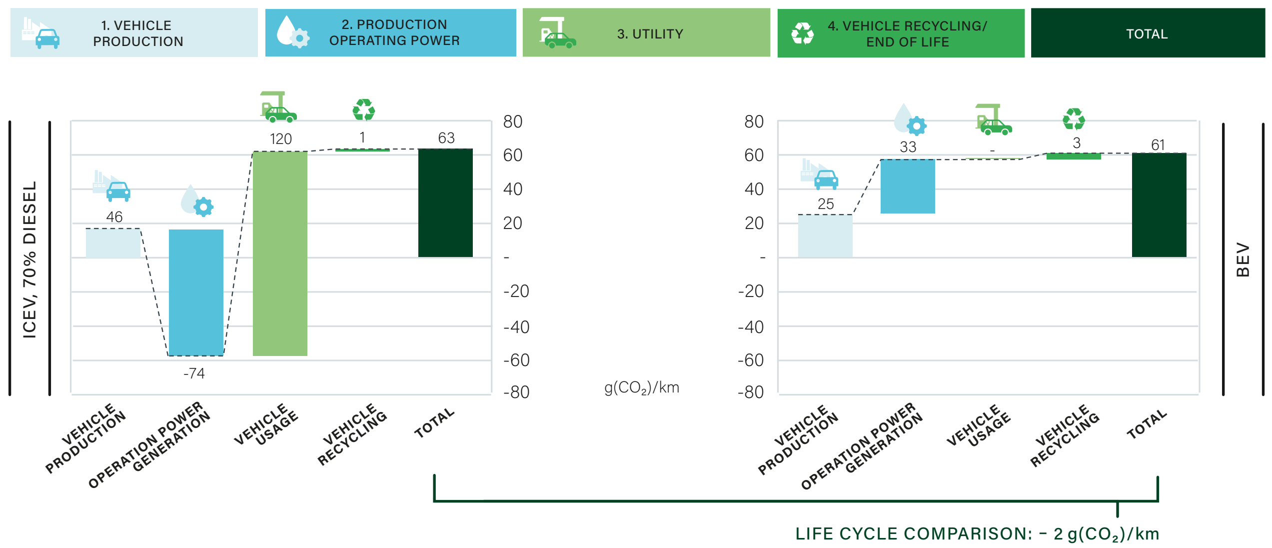
The tendency applies generally: the higher the demand for drive power, the more advantageous ICEV technology becomes (ICEVs quickly gain the advantage in terms of overall CO_2 balance at higher power levels).





Finding 4

With prospective increases in the RES-E proportion[1)] globally, in Europe and nationally, the overall CO_2 balance improves. This applies for both BEVs and ICEVs, in this case with increasing shares of synthetic eFuels. In the mid-size car segment, the total CO_2 emission for BEVs and ICEVs with an assumed utilisation phase from 2040 through 2050 are at similar levels (parameter set[4)]). From 2050, all the drive technologies under consideration could become nearly climate-neutral.



Conclusions

1) Developments in the electricity mix according to the World Energy Outlook 2018 (WEO) of the International Energy Agency (IEA) and "Long-term Scenarios for the Transformation of the Energy System in Germany" (on behalf of BMWi)

2) Possible market ramp-up of e-fuels with adequate political framework conditions ("Status and prospects of liquid energy sources in the energy transition", Prognos et al., 2018)

3) Parameter set: Purchase year: 2020, Service life: 10 years, Annual capacity: 15,000 km, Fuel: Diesel, Operating country: Germany (Reference scenario), Manufacturing country (battery): EU (Reference scenario), Development of electricity mix: Dynamic

4) Parameter set: Purchase year: 2040, Service life: 10 years, Annual capacity: 15,000 km, Fuel: Diesel with 70 per cent e-diesel admixture, Operating country: Germany (Reference scenario), Manufacturing country (battery): EU (Reference scenario), Development of electricity mix: Dynamic

Important conclusions from the studies

1 Technologies must be assessed holistically with regard to their real CO_2 emissions using the LCA approach.

2 These days, in practical scenarios, BEV and ICEV perspectively are at relatively similar levels in terms of their total CO_2 balances.

3 In further designing climate policy strategies and regulations, all target-oriented technologies in the individual mobility field must be taken into account.

4 Synthetic eFuels must be recognised as an essential measure to achieve the climate goals, i.a. in the European regulations setting emission performance standards for cars, vans and heavy-duty vehicles.

The eFuel Alliance is an interest group that advocates for a positive policy framework for the use and production of eFuels from renewable energies. We aim to win broader recognition of the significant contribution eFuels can make in the drive for sustainability and climate protection. Our goal is to facilitate the industrial production and widespread use of carbon neutral synthetic liquid fuels from renewable energy sources.

eFuel alliance

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Find further information here

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eFuels – the solution for tomorrow's climate-neutral transport

Version: 10|2020