MediaInfo

Forschungsvereinigung Verbrennungskraftmaschinen e.V.
FVV | Research Association for Combustion Engines

Petra Tutsch | Communications & Media Relations
T +49 69 6603 1457 | tutsch@fvv-net.de | www.fvv-net.de

21.07.2020

Taking stock: New FVV meta study of life-cycle analyses on alternative powertrain technologies

Life cycle analyses (LCA) provide evidence of how climate-friendly new powertrain technologies really are. A new meta-analysis commissioned by the Research Association for Internal Combustion Engines (FVV) and conducted by Frontier Economics analyses existing life-cycle studies from the last 15 years. A supplementary paper derives central requirements for drafting future climate protection regulations and guidelines: they should be economically efficient, cross-sectoral, open to technologies, global and long-term in nature. The study results show that in a global energy and carbon system, various technology options are available from a climate perspective. There is not one single solution for CO_2 neutrality in the mobility sector. The key to sustainable mobility lies in fair technology competition and the defossilisation of energy production.

Frankfurt/M., 21 July 2020 // Electric powertrains, hydrogen-powered fuel cells and the use of synthetic fuels in combustion engines: Various technologies and fuels are currently being discussed in order to significantly reduce harmful CO_2 emissions from road transport. From a scientific point of view, not only the direct emissions from operation must be taken into account, but also those greenhouse gases that are emitted during the production of the vehicles, the generation of the energy sources/fuels, their distribution and, last but not least, recycling at the end of the vehicle's life. The method of life cycle assessment, usually abbreviated as LCA, has established itself as a means of producing a conclusive overall balance sheet. One challenge here is that the results of LCA studies depend heavily on the assumptions made. In a meta-analysis, the specialist consultancy Frontier Economics on behalf of the FVV has now evaluated for the first time more than 80 individual studies from the past 15 years, which consider a total of 110 different scenarios and 430 individual analyses. In order to ensure comparability, the results of all studies were standardised to a compact passenger car with a total mileage of 150,000 kilometres.

Calculated in this way, there is a relatively narrow band of total emissions over the lifetime of the vehicle for all combinations of powertrains and energy sources or alternative fuels. The average value over all studies ranges from 25 to 35 tonnes of CO_2 per vehicle, provided that fossil fuels are still used proportionately for the production of electricity, hydrogen or synthetic fuels. If, on the other hand, only regeneratively produced energy sources are used in operation, the average value is between 9 and 16 tonnes of CO_2 for the entire service life of the vehicle. The remaining emissions then result mainly

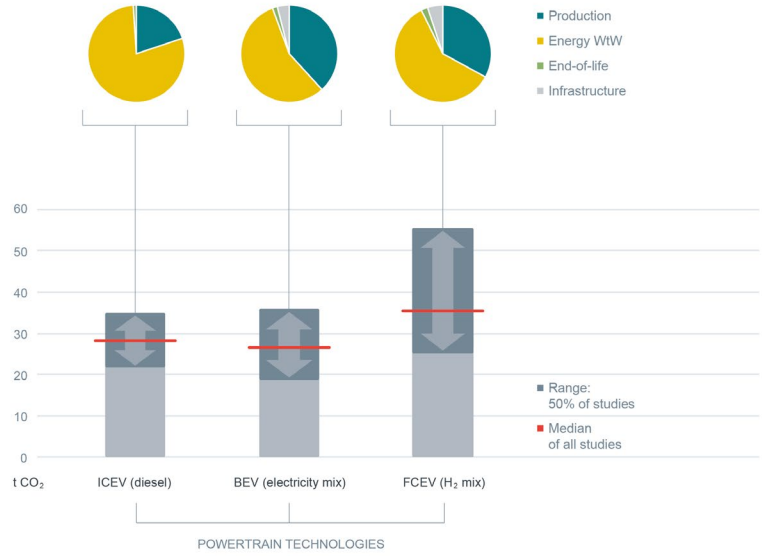
from the production of the vehicles, the production facilities and the infrastructure for the distribution of the energy sources. All in all, the average values of the results of this study show large differences between the individual studies, which often amount to many times the differences between the individual technologies. "There is no clear winning technology," summarizes Dr David Bothe of Frontier Economics. "Above all, however, the meta-study shows how great the uncertainty in life-cycle analyses still is at present."

For example, in none of the studies the GHG emissions resulting from the installation of the energy infrastructure were calculated down to individual vehicles. In addition, there are fewer than average results available on the influence of recycling - which can certainly improve the CO_2 emissions of battery production, for example - and the results, moreover, scatter widely. While vehicles with battery electric drives or conventional internal combustion engines were considered in almost all studies, only a quarter of all studies make statements on the overall balance of plug-in hybrid vehicles, which are expected to achieve a significant market share in the 2020s. Fuel cell passenger cars are also only included in 22 studies. Valid results for the use of synthetic fuels are almost completely missing. "In addition, no one has yet investigated where mobility today, despite its harmful impact, may also contribute to climate protection," says Bothe. "For example, the rotor blades of a wind power plant are transported to their location by heavy-duty fossil-fuelled commercial vehicles across the country. In the electricity sector, these plants then avoid emissions. We find such cross-sectoral effects in many places in the economy".

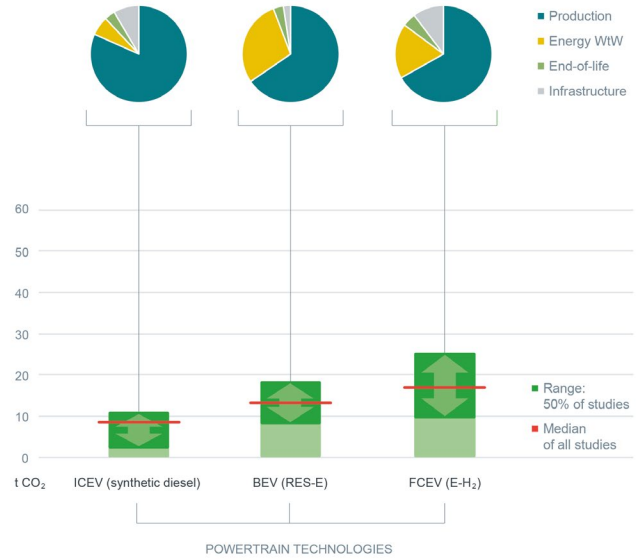
Despite the considerable uncertainties, a general statement can be made: Only a valid life cycle-analysis allows an objective assessment of technological options. In particular, it is important to avoid reducing the emissions from operations assigned to the transport sector by assigning additional emissions to the energy or industrial sector. For example, the study uses a sample calculation to show that if electric mobility were to be introduced on a broad scale without accompanying measures, 90 percent of the cumulative CO_2 savings from passenger car transport could reappear in other sectors and regions by the year 2030, and would thus be of little benefit to climate protection.

The goal is clear: By 2050, road transport is to become climate-neutral. When determining which paths to follow to achieve this goal, one should also bear in mind the time dimension of one-off events, such as a narrow focus on a sector-specific annual target: Large one-off emissions could lead to an increase in emissions in other years and/or sectors and the total CO_2 budget calculated by the Intergovernmental Panel on Climate Change (IPCC) could be exceeded. FVV Managing Director Dietmar Goericke sums up: "From an academic point of view, the results of the meta-study simply only mean: We need more data and more detailed research as a basis for valid political decisions. To do this, we need to keep research open to any new technologies."

Images



Life-cycle emissions from current energy sources
© Frontier Economics | FVV



Life-cycle emissions when using 100% renewable energy for operation
© Frontier Economics | FVV

Dr David Bothe, Associate Director
Frontier Economics Ltd., Cologne, Germany
© Frontier Economics

Dietmar Goericke, Managing Director
FVV eV, Frankfurt/Main, Germany
© FVV

Download at www.fvv-net.de/en/media/press

About FVV

FVV | The Research Association for Combustion Engines is a globally unique network of companies, research & technology performers (RTD) and funding bodies. In the context of pre-competitive Industrial Collective Research (IGF), manufacturers of automotive engines, industrial engines, fuel cells and turbomachinery as well as their suppliers and service providers work together with universities and other research establishments on cutting-edge technologies. The aim is to make internal combustion engines, hybrids, turbomachines and fuel cells cleaner, more efficient and sustainable – for the benefit of society, industry and the environment.

Combustion engines and fuel cells facilitate individual mobility, transportation, energy supply and industrial added value. The innovative power of the industry and its economic success make a significant contribution to social prosperity. As a non-profit organisation, the FVV supports the development of its members - small, medium and large companies - and the promotion of young scientists through pre-competitive industrial collective research.

The FVV is a member of the German Federation of Industrial Research Associations (Arbeitsgemeinschaft industrieller Forschungsvereinigungen - AiF), the leading national organisation for applied research and development for SMEs. It has invested more than 500 million euros in 1,200 research projects since it was founded in 1956.

More information can be found at www.fvv-net.de/en/