eFuel alliance

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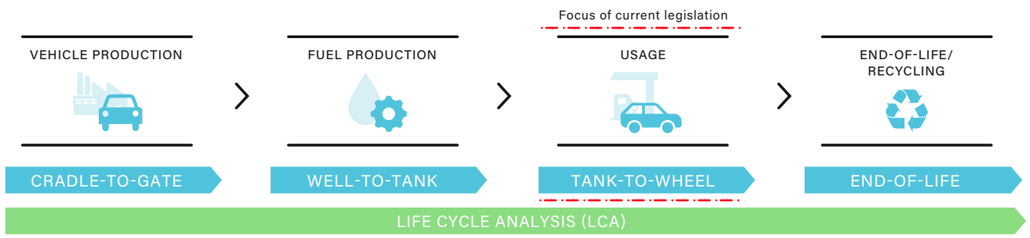
information brochure

Life Cycle Analyses (LCA)

Brief comparison between eight current studies:
The carbon footprint of different car drive technologies

Life cycle analysis versus a narrow **“Tank-to-Wheel”** assessment

For climate protection it is irrelevant in which sector (or country or at what time) CO_2 is emitted. Due to its severely reductive approach, the outdated Tank-to-Wheel assessment does not take into account significant CO_2 emissions and can therefore lead to erroneous environmental policy decisions or regulations. This can do more harm than good to the climate. Therefore, CO_2 footprints must be recorded more holistically (= Life Cycle Analysis, or LCA)[1].



Since 2019 at the latest, the **scientific and professional community** has been applying the **LCA approach to assess carbon footprints.**

Current regulation is based on the limited **“Tank-to-Wheel”** approach and not on the LCA.

Eight studies on **the climate footprint of car engine drives**

Common to all research: Several stages of the value chain are taken into account for the carbon footprint assessment – from vehicle manufacturing to use and, in some cases, recycling. The **“Tank-to-Wheel”** analysis is **no longer applied in any research.**

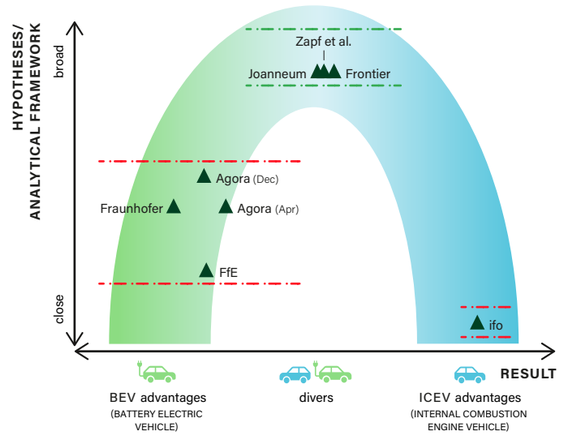
Modern policy-making should focus on **developing goal-oriented regulation based on LCA.** Realistic climate protection policies and a holistic carbon footprint are only feasible with an LCA approach.

TITLE OF THE STUDY	AUTHORS	PUBLICATION	VEHICLE PRODUCTION (CRADLE-TO-GATE)	FUEL PRODUCTION (WELL-TO-TANK)	USAGE (TANK-TO-WHEEL)	END-OF-LIFE/ RECYCLING (END-OF-LIFE)
Kosteneffiziente und nachhaltige Automobile – Bewertung der realen Klimabelastung und der Gesamtkosten – Heute und in Zukunft (Cost-Efficient and Sustainable Automotives – An Assessment of their Real Climate Impact and Total Costs – Today and in the Future)	Zapf, Pengg, Bütler, Bach, Weindl	December 2019	✓	✓	✓	✓
Klimabilanz von strombasierten Antrieben und Kraftstoffen (Carbon Footprint of Electricity-Based Drives and Fuels)	Agora Verkehrswende, ifeu	December 2019	✓	✓	✓	✓
Die CO_2-Gesamtbilanz für Antriebstechnologien im Individualverkehr heute und in Zukunft (The Overall CO_2 Impact for Drive Technologies in Individual Transport Today and in the Future)	Frontier Economics	November 2019	✓	✓	✓	✓
Geschätzte Treibhausgasemissionen und Primärenergieverbrauch in der Lebenszyklusanalyse von Pkw-basierten Verkehrssystemen (Estimated Greenhouse Gas Emissions and Primary Energy Consumption in the Life Cycle Analysis of Passenger Vehicle Based Transport Systems)	Joanneum Research Life	September 2019	✓	✓	✓	✓
Klimabilanz von Elektroautos (The Carbon Footprint of Electrical Automobiles). Einflussfaktoren und Verbesserungspotenzial (Relevant Factors and Potential for Improvement)	Agora Verkehrswende, ifeu	April 2019	✓	✓	✓	✓
Kohlemotoren, Windmotoren und Dieselmotoren: Was zeigt die CO_2-Bilanz? (Coal Fired Engines, Wind Engines and Diesel Engines: What do their Carbon Footprints Show?)	Buchal, Karl, Sinn	April 2019	✓	✓	✓	X
Die aktuelle Treibhausgasemissionsbilanz von Elektrofahrzeugen in Deutschland (Current CO_2 Footprint of Electric Vehicles in Germany)	Fraunhofer ISI	March 2019	✓	✓	✓	X
Klimabilanz von Elektrofahrzeugen – Ein Plädoyer für mehr Sachlichkeit (Carbon Footprint of Electric Vehicles – a Plea for More Objectivity)	Research Centre for Energy Economics (FfE)	February 2019	✓	✓	✓	X
						90 % – 95 %

The percentage of the carbon footprint in the **life cycle stages production, fuelling/charging and utilization of vehicles** is, based on current findings, **approximately 90 % to 95 %.**

1) “Die CO_2-Gesamtbilanz für Antriebstechnologien im Individualverkehr heute und in Zukunft” (The Overall CO_2 Impact for Drive Technologies in Individual Transport Today and in the Future), Frontier Economics, November 2019.

All **important LCA criteria** must be covered as far as possible!



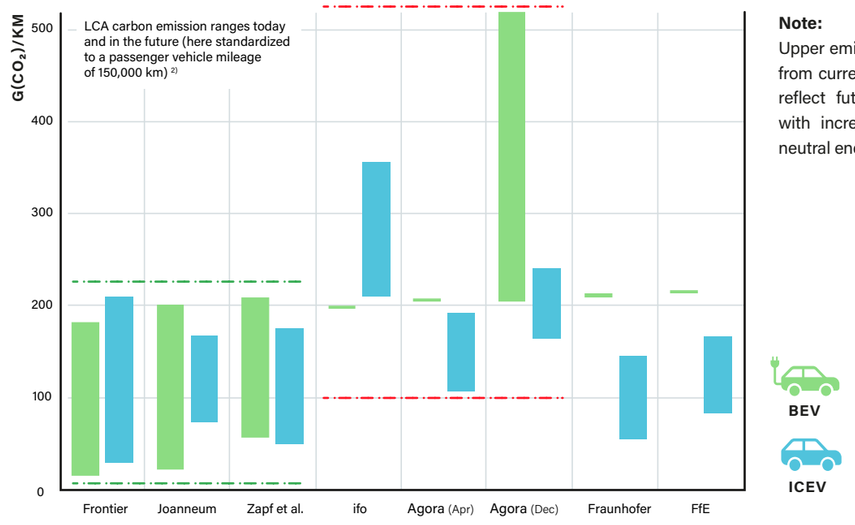
Broad framework for analysis and thus **broad coverage of all important LCA criteria:** Frontier Economics, Joanneum ResearchLife and Zapf et al.

Narrow analyses lead to one-sided results – Risk: incorrect conclusions!

Important LCA criteria at a glance:

- Are all the **relevant passenger vehicle life cycle stages** included **in** the **carbon footprint** (incl. battery production and regional site conditions)?
- Are the **relevant drive technologies analysed?**
- Is the **variety** of **personal transport** adequately **represented** (e.g. user profiles: frequent drivers versus occasional drivers)?
- Are **several passenger car** classes being **examined** (e.g. not just the “compact class”)?
- Is the **technology comparison “fair”** (comparison conducted within the same class of passenger vehicle)?
- Are the **present and the future** comprehensibly **considered** (for all car life cycles: dynamic development of renewably generated electricity and increasing percentages of climate-neutral fuels, eFuels)?

Three Studies with **coverage of all relevant criteria** and **similar carbon footprint ranges:**



Note:
Upper emission limits tend to result from current scenarios; lower limits reflect future optimistic scenarios with increasing shares of climate neutral energy and fuels (e-fuels)[2].

Studies with **higher coverage of the LCA** criteria arrive independently at **similar carbon footprint ranges** for BEVs and ICEVs.

Studies with a **narrow analysis framework** show **strongly divergent results** (in part due to one-sided, static considerations).

2) “Vergleich von Studien zur CO_2-Gesamtbilanz für Antriebstechnologien im Individualverkehr – eine Vergleichsstudie” (Comparison of Studies on CO_2 Balance for Private Transport Technologies – A comparative study on behalf of Uniti), Frontier Economics, May 2020.

Our **policy conclusions**

1 Sound climate policy regulation must follow the scientifically approved LCA (life-cycle analysis) approach.

2 The "Tank-to-Wheel" approach ignores large parts of CO_2 emissions and is therefore not appropriate for climate policy decision-making.

3 In every LCA study that objectively covers all the important criteria for a carbon footprint, internal combustion engine vehicles (ICEV) and battery electric vehicles (BEV) are close to each other in terms of CO_2 emissions – today and in the future.

4 Policies are required that allow for a dynamic increase in the percentage of climate-neutral energy carriers and fuels (eFuels).

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.

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Watch video

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

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