Frequently asked questions on T&E's EV LCA tool

April 2020

1. Do you include hydrogen and plug-in hybrid electric cars in your tool?

If we want to reach climate neutrality by mid-century, plug-in hybrid electric will not be suitable because they are not fully zero emission as they run partly on the internal combustion engine. Similarly gas cars would also have higher emissions than fully electric cars due to the fuel combustion.

We therefore decided to focus on the latter. Nevertheless, we will update this tool by adding data, at the moment lacking, on the lifecycle emissions of alternatively fueled vehicles (hydrogen fuel cell electric cars, plug-in hybrids and gas CNG cars).

2. Do you use real-world or lab emission figures in your tool?

Regulatory lab test protocols (WLTP or NEDC) are not used here because they seriously underestimate real-world fuel consumption and therefore CO_2 emissions (real-world test results diverge from lab tests by 39%, according to the ICCT).

For diesel and petrol cars, we used the average real-world consumption (CO2 emissions) of the 2018 top 10 most-sold vehicles for each category.

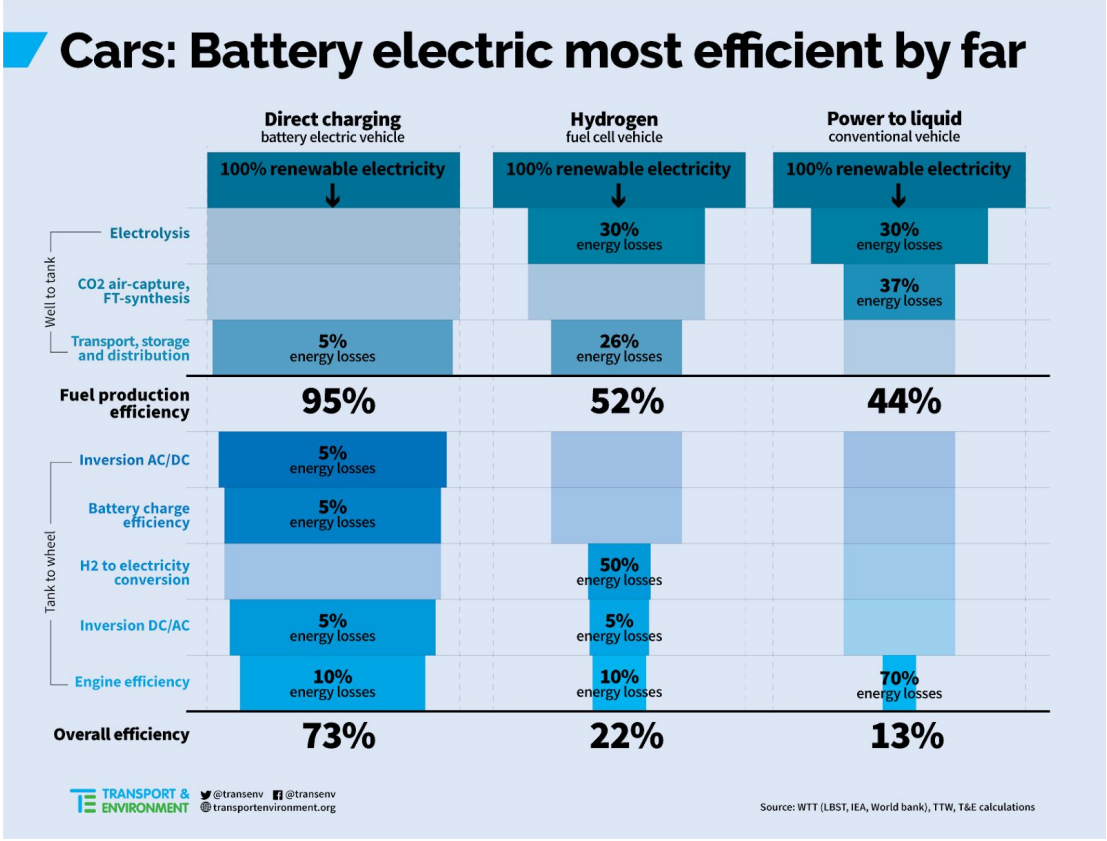
Fuel and energy consumption is based on real-world consumption declared values from millions of drivers, taken from the spritmonitor.de database.

3. Do electric cars CO2 emissions account for carbon intensive electricity in countries like Poland?

Yes, our model takes into consideration the evolution of the carbon intensity (from 2020 to 2045) of electricity used around Europe at national level, including Poland.

4. Why is an electric car in Poland still cleaner than a diesel or a gasoline car?

Electric cars are much more efficient than diesel or petrol cars, that lose a lot of energy in the form of heating in the combustion engine. Indeed, as it can be seen below, EVs only lose 10% of the energy in the motor efficiency (77% efficiency on a tank to wheel basis) while internal combustion engines lose 70% in the engine (30% TtW efficiency).



Also, thanks to recent improvements in decarbonising battery production and electricity production, electric cars are now cleaner even in countries that still depend heavily on coal, like Poland.

5. Why is an electric car in 2030 cleaner than in 2020?

Chiefly because the electricity production is expected to decarbonise rapidly in the EU in the next decades and reach carbon neutrality by 2050. Renewable electricity generation is expected to increase from 35% in 2019 to 43% in 2025, 55% in 2030 and 74% in 2040.

6. Why doesn't the tool allow you to compare a small diesel/gasoline car with a big electric car?

Comparisons are made between equivalent segments (medium car, large car, executive car, etc.) in order to be relevant. Consumers buy a car based on a need: small and medium cars are more suitable for cities, big cars are more suitable for high mileage, etc. As a result a consumer wouldn't hesitate between buying, for example, a small diesel/petrol car or a big electric car, which makes a comparison between those two segments irrelevant.

7. Do you include all the emissions from electricity production, including transportation and power plant manufacturing?

Yes, all lifecycle carbon emissions from electricity generation are included. This includes emissions generated by burning fossil fuels in power plants (e.g. coal or gas) to produce electricity, but also the upstream emissions from the production of the powerplants. For renewables, the upstream emissions from the extraction of the metals and the manufacturing of the solar panels or the wind turbines are also included. As a consequence, no source of electricity is completely zero CO2 emissions (the lowest being wind electricity).

In our LCA, the total life cycle CO_2 emissions for each electricity supply technology is based on IPCC's Fifth Assessment Report. For more details, see Annex I.

Transportation and distribution losses of the electricity from the powerplant to the EV charger are also included (country-specific values from IEA). On average, at EU level, these losses increase the carbon intensity of the grid by about 7%.

8. Do you include the carbon impact of resource extraction for batteries?

Yes, all emissions from the value chain of the battery production are included. Upstream emissions, which are mainly due to mining and refining, are the same in all scenarios (e.g. China, low-carbon, etc).

9. Is the recycling of batteries taken into consideration?

Recycling of batteries is not yet taken into account by this tool because there is little solid evidence to support what could be the impact of recycling. Existing studies provide values that are within the margin of error and do not rely on fully scaled-up and efficient recycling plants.

It is expected that in the next few years, as battery recycling facilities ramp up significantly in Europe, there will be much more evidence and we would be able to incorporate the benefits from battery recycling and the development of a circular value chain for battery materials.

This study gives some further indications on the benefits of recycling. According to it, “while pyrometallurgical and hydrometallurgical processes do not significantly reduce life-cycle greenhouse gas emissions, direct cathode recycling has the potential to reduce emissions and be economically competitive”. Based on the study, CO_2 emissions avoided by using direct recycling of battery cells could be around 1 to 2 kgCO_2e/kg battery. But to correctly account for these benefits, further research on end-of-life recycling is needed.

10. Why is the emission curve from EVs not a straight line ?

The rapid uptake of renewables in the electricity mix has an important consequence: an electric car bought today will keep getting cleaner throughout its lifetime, which is usually not considered in life cycle analysis.

Further information

Lucien Mathieu
Transport and Emobility Analyst
Transport & Environment
lucien.mathieu@transportenvironment.org
Mobile: +32 483 08 48 91