4 Easy Steps to Identify Greenwashing

Reality Check

"Electric Vehicles emit more CO2 than Diesel Cars"

May 2019

BELLONA
EUROPA

DISCLAIMER

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The issue with Greenwashing

Over the past years, we have witnessed a lot of attempts at spreading wrong and misleading information in the environmental field. The car industry claiming that synthetic fuels are a clean alternative to fossil fuels [1], electricity being sold as green while it actually isn't [2] or carbon offsetting [3] are just a few examples. This happens for various reasons ranging from lack of deeper understanding of a topic, to tactical greenwashing with the aim to manipulate public opinion. No matter the motivation, spreading such false information is always a waste of time that we could be spending in taking the real environmental and climate action so that we maintain our chance at actually combatting climate change.

We want you to walk through this wave of greenwashing with open eyes so that you can critically evaluate the information out there and spot greenwashing. That is why we are giving you a little insight on the work we are doing and show you how you can avoid falling into the trap of believing allegedly scientific reports. Using an example of such opinion pieces that exists to first and foremost sow doubt, we want to give you 4 easy steps to identify greenwashed news.

A recently released study by the German Ifo institute compares emissions of a Diesel and an electric vehicle (EV) [4]. The authors concluded that under current conditions in Germany, Diesel would emit less CO_2 than their electric counterparts. Unsurprisingly these results went viral right away. Unsurprising, they were met by many critical voices which raised concerns over the study's findings –or rather, its basic assumptions which led to its results.

Step 1: What are the interests?

1.1 The Authors

Hans-Werner Sinn is a renowned German economist and has published a couple of reports mainly on economic topics and he was also the president of the Ifo Institute for Economic Research for a couple of years. Christoph Buchal is a German physicist and has written a few books on various physical topics.

While the authors seem to have lots of knowledge and expertise in their areas of their profession, there's no record of them specialising on transport and mobility topics.

1.2 Affiliations and Beliefs

As the Ifo institute is funded by public money, there is probably no big fossil fuel or gas industry conspiracy behind his study.

It seems that Sinn as well as Buchal are both just retired professors which voice their own personal opinion as scientific fact, for reasons only they know.

"SO, AS FAR AS I'M CONCERNED, THESE ARE THE NON-PEER REVIEWED OPINIONS OF LAYPERSONS" - AUKE HOEKSTRA, EV ACADEMIC

Step 2: What are the assumptions?

2.1 Fair comparison?

A comparison of two cars with different drive trains needs to ensure that the type of car is comparable as much as possible. The choice of an upper class Diesel Coupé with the Tesla 3 appears at first sight to be a sensible one. However, the power of the electric Tesla Model 3 stands with 351hp (or even 487hp in the long-range performance version) significantly above the engine of the Mercedes C220 with just 194hp. Taking, instead the more powerful C300d 4MATIC engine that at least reaches about 345hp, as done by the Spiegel analysis [5], would increase the respective CO_2 emissions based on the NEDC plus 21% from 141gCO2/km to 165.7 gCO2/km. (Note: it appears that the Spiegel authors did not take the same C-Coupé lower-end NEDC emission levels as a basis for comparison, resulting in an even higher 176 gCO2/km)

→ **In general, always do a background check about the main objects discussed in the study. The comparison made by the authors is sometimes not motivated by a scientific process but by which comparison provides the desired result. Unfortunately, this happens at the expense of science.**

2.2. Data selection

The study is based on the widely discredited NEDC values. As mobility expert Don Dahlmann points out, they are around 30% too low because, well, carmaker's cheat [6]. Indeed, the difference between lab test results and real like experience is about 45% for combustion engine significantly.

Yet, already a different drive cycle lab test results in a very different outcome. While the authors use the lower end data for the C220d of 117 gCO2/km, under the new WLTP this would increase to 138 gCO2/km. According to the study, the reason for choosing the NEDC was because the new WLTP data was not available for the Tesla 3. A quick look at the Tesla 3 sales page, however, reveals that Tesla does provide the WLTP for the Model 3 with a range of between 530-560km. Since the study takes the more favourable, lower end data of the C220d, doing the same for the Tesla suggests some 13.4kWh/100km (the study chooses a value belowthe lower end estimate, which is 15kWh). Based on the WLTP data, ceteris paribus (keeping the used CO2 grid intensity and battery production emission assumptions equal), the Mercedes C220d reaches 167 gCO2/km, and the Tesla between 146 and 171 gCO2/km. When also taking into account the weaker motorisation of the C220d, and instead using the less unequal C300d, the upper limit of the Tesla's overall emissions is even 7.5% lower than the 185 gCO2/km of the Diesel.

	Tesla Model 3	C220d Coupé	C300d 4MATIC
HP	351 hp	194 hp	345 hp
Emissions →NEDC	155-180 gCO2/km	141 gCO2/km	176 gCO2/km
Emissions →WLTP	146-171 gCO2/km	167 gCO2/km	185 gCO2/km

--> Highest emissions

The emissions resulting from the battery production are based on the much-criticised and scientifically flawed "Sweden Study" that represents something of a worst-case battery production scenario [7]. At the same time, accounting a mere 21% for extraction, refining, and transport of oil appears a low margin, when considering that the mere extraction results in 389 g/L and refining adds about 260 g/L [8]. Together, these alone make up about 25% of the "official" Diesel combustion.

So, in summary, even under lab-based data (WLTP) that is known to benefit the combustion engine, and in light of a "worst-case" battery production emission footprint, paired with understating the CO2 emissions resulting from the extraction, refining and transport of fossil Diesel, EVs are still cleaner than comparable Diesel cars.

→ **It is extremely important to do a thorough background check on the data that were used and if there might be any alternative databases which might have been more accurate and reliable. Unfortunately, even widely discredited data is still being used in research for result-oriented purposes. In science, it is important to have robust results. This means that you test for the consequences of minor changes to the assumptions – this includes the data source itself.**

2.3. Characteristics of subjects of study (Battery Emissions)

The authors assume that the life cycle of a battery only lasts for 150,000km, which is just 300 cycles. Tesla itself guarantees an 8 years lifetime, or 192,000km [9]. Under EU law, Mercedes is obligated to provide a two-year warranty (without a mileage limit), and offers a premium warranty package from Mercedes for 12 years or 200,000km. During this time, combustion engines need more parts replaced due to wear and tear than EVs. Indeed, some analyses have shown that a single battery can drive for more than 270,000km and still have 91% of its initial capacity left.
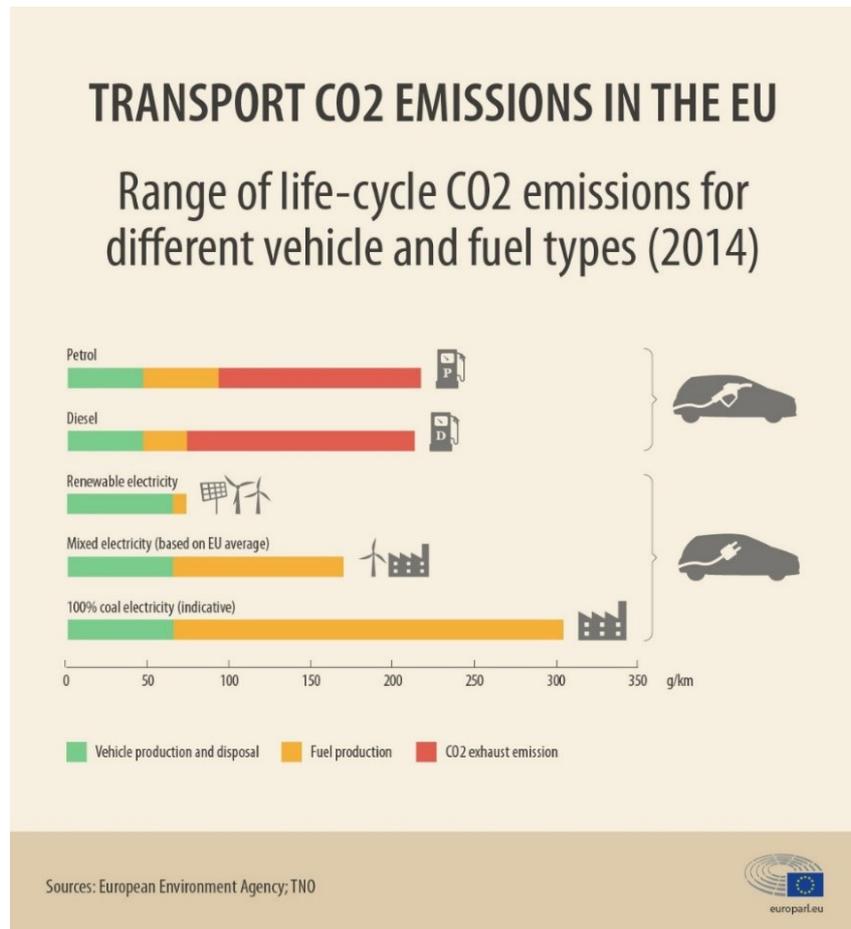
Even after 500,000km, about 80% of the capacity remains [10]. This should also be considered in comparison to the average lifetime of an internal combustion vehicle of 220,000km. In addition to the much longer lifetime of a battery, neither recycling nor second life of batteries after they are exchanged were taken into consideration. Together, these facts can significantly reduce the overall CO2 footprint of batteries.

→**Questions to ask: How are the subjects of the study defined? Are the characteristics of those subjects accurate and in tune with the aim of the analysis? Are all characteristics weighed equally or are some focused on more, while others are being ignored?**

2.4. Contextual Calculations

Power emissions for the Tesla 3 are estimated based on the average German grid emissions of about 0.55kgCO2/kWh. Taking the average grid emissions is a sensible approach as final power used by consumers is always grey, i.e. represents the actual mix of power generation at the particular place and point in time. Also guarantees of origin for renewable electricity that are used by many changing station operators cannot change this fact.

TRANSPORT CO2 EMISSIONS IN THE EU

Range of life-cycle CO2 emissions for different vehicle and fuel types (2014)

Petrol
Diesel
Renewable electricity
Mixed electricity (based on EU average)
100% coal electricity (indicative)

0   50   100   150   200   250   300   350   g/km

■ Vehicle production and disposal   ■ Fuel production   ■ CO2 exhaust emission

Sources: European Environment Agency; TNO

europarl.eu

As the above adjustments to the assumptions of the Ifo analysis in 1) and 2) have shown, even at the currently rather dirty power generation in Germany, EVs are still relatively clean – and cleaner than actually comparable combustion engine cars. On an EU level, the average CO2 intensity is even less than in Germany. Overall, through the addition of new renewable capacity, grid emissions are set to reduce every year with the possibility of reaching zero emissions, whereas Diesel is unlikely to ever reach zero emissions.

This means that the emissions of an EV per km are going to reduce steadily, while the emission from the fossil fuel production will not.

When a study includes a lot of calculations, it's necessary to do a background check on what kinds of numbers were used and whether those numbers would stay constant over a certain period of time. Also, studies which focus on one specific area are often not applicable to other countries, as numbers change completely.

Step 3: What has been ignored?

3.1. Production Effects
(Emissions for Diesel Engine Production)

On the one hand, the authors are adding emissions for battery production to the rest of the Tesla's energy consumption. On the other hand, they ignore the emissions for the production of the car components, including internal combustion engine (ICE), transmission and exhaust system [11]. Only in a footnote do the authors mention that based on a study from 2011 the engine production for the Diesel engine is more CO2 intensive (0.8tCO2) than the electric car engine (0.3tCO2), without the battery. They exclude any potential wear and tear replacement. This is potentially only a marginal emission effect on the full life-cycle emissions of a car. For the sake of completeness this should not have been ignored.
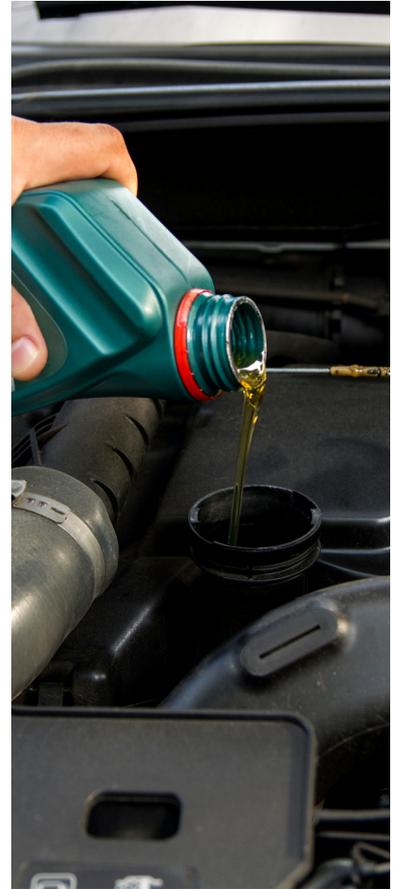
3.2. Environmental Effects

While CO2 is an important aspect when considering the transition from ICE to electric drive trains, it is not the only one. The focus of the Ifo study excludes a large chunk of the debate. Indeed, most of current issues in Germany revolving around Diesel bans are not targeted at CO2, but other harmful emissions, such as NOx and SOx, and their dangerous effects on human health [12]. Beyond the ever-improving CO2 impact of EVs, a key argument in their favour is the lack of any direct emissions of fine particles and reduced noise pollution.

At the production site, the environmental effects of fossil fuel industry need to be accounted for as well; from the drilling itself, and the effects of oil spills on the affected biospheres. Such spill exists in different magnitudes, from heavy oil leaking from ships, to oil tanker accidents, and of course major blow outs, such as the Deepwater Horizon incident [13].

At the same time, it is crucial not to forget the negative impacts of battery production. EV batteries are predominantly Lithium-ion batteries, which use Lithium, Cobalt, Nickel, and Graphite. The increasing demand in EVs has shed a light on the origin and mining process of the raw materials used for batteries, which happen at a high human and environmental cost. Child labour, terrible working conditions, pollution and environmental damage are happening due to the blooming demand in batteries for smartphones, other electric devices and also electric vehicles. Luckily, affected companies and policy makers are well-aware of this issue and are already launching initiatives to better the situation. The Global Battery Alliance, for instance, is aiming to "to clean up supply chains and re-use battery waste" [14]. On an EU-level, the commission has brought the European Battery Alliance into being to "create a competitive manufacturing value chain in Europe with sustainable battery cells at its core." [15].

Volkswagen and Northvolt are cooperating in the frame of a European Battery Union, which aims to push forward the development of EU battery production for electric cars [16]. BMW, BASF and Samsung is working with the German Development Agency (GIZ) for the responsible sourcing of cobalt from the Democratic Republic of Congo, looking to improve the conditions of local miners and their families [17].

Furthermore, the EU is planning to revise its Battery Directive, dating from 2006, which was implemented before the widespread use of electric vehicles.

The EU will need to ensure that the upcoming revision sufficiently addresses the ethical and environmental impacts of battery production and the sourcing of raw materials, without imposing a legislative burden which discourages the uptake of electric vehicles and the subsequent decarbonisation of the transport sector. Ensuring batteries do not face unfavourable treatment compared to oil extraction activities is important.

The rising demand in raw materials for batteries is unlikely to hinder the transition to electro-mobility at the moment, as resources remain available. Therefore, such initiatives are crucial to ensure a sustainable and worker-friendly battery production chain. Nevertheless, working to recycle and reuse batteries at the end of their usable lives is equally important.

→ Did the authors make sure not to ignore important aspects? Of course, it is not possible to include every detail that could somehow influence the result. However, be skeptical when it seems like a study covers certain aspects while leaving others out which should deserve just as much attention.

Step 4: What are the consequences?

"Diesel cars are cleaner than EVs"

Overall, the past years have again and again brought about studies that go through a lot of effort to show that electric cars can be less clean than believed, or even compared to the most modern internal combustion engines. Most of these studies fail to withstand basic scientific tests for robustness – which can also be said about the current Ifo study. EVs and their battery production are not without issue, yet as we continue to decarbonise Europe´s power generation, EVs carbon footprint will only fall. To conclude with a to-the-point summary statement from car expert Auke Hoekestra´s study on the issue of EV emissions: "EVs only emit more CO2 if you make unrealistically negative assumptions for battery production, battery life and electricity mix while making unrealistically positive assumption about diesel consumption." [18].

The figures in this report were made using vector icons from Gettyimages and Unsplash databases.

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