



Leibniz Institute for Financial Research SAFE
Sustainable Architecture for Finance in Europe (<https://safe-frankfurt.de/>)

SAFE Finance Blog

The Climate Effects of Electric Cars: Expensive, but Underestimated

01/30/2019

Alfons Weichenrieder: Technical studies attest only minor advantages in terms of carbon footprint to the use of electric cars compared to vehicles with conventional power engines. However, important economic conditions are overlooked



There is great uncertainty on the retail market for cars. Does it still make sense to buy a diesel vehicle? On the other hand, what about the climate-related effects of electric cars?

There are also major concerns about the second question. After all, the production and operation of electric cars are not CO₂-free if the electricity used comes from coal-fired power plants. In the worst case scenario, CO₂ emissions from road traffic could even increase if more people switch to an electric car. In

this case, the only option would be to reduce fine dust and nitrogen oxides in the inner cities.

These fears are not groundless. Last summer, the Federal Ministry for the Environment presented calculations (https://www.bmu.de/fileadmin/Daten_BMU/Pool/Broschueren/elektroautos_bf.pdf) showing that CO₂ emissions of electric cars over their life cycle are only 16 percent lower than emissions of diesel vehicles running with the current electricity mix. Other studies have also so far confirmed that electric cars have a carbon footprint that is surprisingly only slightly better than that of diesel cars.

The rules of the economic environment matter

Although these studies try to cover the entire consumption and often even the production cycle of vehicles in terms of pollutant emissions, they have a problem. They completely ignore the economic environment under which CO₂ emissions occur. The results are therefore more than questionable in the European context.

The system of European carbon trading is key in defining the economic environment: the additional demand for coal-fired electricity generated by charging the additional electric cars, means in this system, that the energy industry needs additional CO₂ certificates. Since the European Union as a whole limits the amount of certificates, this implies, conversely, that the electricity industry has to buy them from other usages, thus withdrawing them from the market. Accordingly, these other industries generate less CO₂.

This means that every ton of CO₂ additionally produced by electric cars and the associated demand for coal-fired electricity is offset by a ton of CO₂ that has to be saved somewhere else in the European economy. Any increase in emissions generated by an additional electric car is thus completely compensated elsewhere. Technical studies do not consider this. They are therefore too pessimistic when it comes to assessing the effect of electric cars on the carbon footprint.

Even by phasing out gasoline or diesel cars, there are important economic effects. However, the European trade of CO₂ is not affected by them. The electricity industry, which provides coal-fired electricity for charging electric cars, is linked there, but not the car traffic. Neither drivers have to buy certificates for their CO₂ emissions, nor does the oil industry, which supplies the petrol for the production of the emissions. So if cars with conventional power engine are abandoned, no certificates will be released that would lead to more CO₂ emissions elsewhere. Therefore, there are some arguments in favor of switching to or abandoning a fuel-powered car to save the corresponding amount of CO₂.

However, there may be price effects on the oil market that may stimulate the demand for oil. Someone who has previously driven a conventional car and thus contributed to CO₂ emissions in traffic, saves it when switching to an electric car. At the same time, however, it requires less fuel. If there is enough reduction of demand for conventional power engine cars, then the price of petroleum products drops - which elsewhere in the world leads to an increase in demand due to the lower price and thus also in sales. Crucial for the overall carbon footprint is therefore the extent to which demand is expanding elsewhere on the oil markets. However, this is only a counter-effect: the resulting increase in demand elsewhere cannot overcompensate for the lower demand of the electric car owner.

The technical calculations on the CO₂ superiority of electric cars compared to vehicles with conventional power engines are based on numerous assumptions. Even if the technical calculations were far too optimistic: due to the European CO₂ trading system, there is no reason to fear an increase in CO₂ emissions. This can contribute to moral relief for buyers of electric cars.

Missing cap on CO₂ emissions in car traffic allows reduction

In the economic analysis, the CO₂ advantage of a private switch to the electric car ultimately results from an asymmetric policy at European level. While the trade of certificates already covers the majority of CO₂ emissions in manufacturing and power generation, this does not apply to car traffic. Someone who

switches from a diesel to an electric car implicitly purchases additional certificates through her electricity bill and via her electricity producers and removes them from other environmentally harmful deployment. At the same time, the reduced demand for gasoline does not lead to an increase in the supply of certificates, which would mean an equal increase in emissions elsewhere. The same environmental effect would be significantly cheaper to achieve due to the small advantage of the electric car, by explicitly buying certificates, decommissioning them and continuing to drive an efficient internal combustion engine. Switching to electric cars is a very expensive way to avoid CO₂. The amount of CO₂ emitted by a middle-class car over its lifecycle will only cost about 1,000 euros elsewhere. This can easily be estimated because it would be possible to achieve the approximately 40 tons of CO₂ through the shortage of CO₂ allowances, which currently cost around 25 euro per ton. Nonetheless, the high cost does not change the fact that total emissions would fall as a result of the switchover in Europe, even if only coal-fired electricity was used for charging.


Alfons Weichenrieder (<https://safe-frankfurt.de/research/researchers/researchers-details/showauthor/52-weichenrieder.html>) is Professor of Economics and Public Finance at Goethe University, Frankfurt.

Keywords: Empowering Private Investors (https://safe-frankfurt.de/news-latest/safe-finance-blog/search-result-blog.html?tx_news_pi1%5BoverwriteDemand%5D%5Bcategories%5D=39&cHash=84326f48dcf12fe6416e31d6174082f), Climate Change (<https://safe-frankfurt.de/news-latest/safe-finance-blog/tag/climate-change.html>), E-Mobility (<https://safe-frankfurt.de/news-latest/safe-finance-blog/tag/e-mobility.html>)



Back (<https://safe-frankfurt.de/news-latest/safe-finance-blog.html>)

Want to get regular updates?

 [Subscribe to the Finance Blog RSS feed \(http://safe-frankfurt.de/home/rss-policyblog.xml\)](http://safe-frankfurt.de/home/rss-policyblog.xml)

 [Follow us on Twitter \(https://twitter.com/SAFE_Frankfurt\)](https://twitter.com/SAFE_Frankfurt)

Enter your email address to get regular blog updates.

* Please read our data protection statement (<https://safe-frankfurt.de/about-safe/data-protection.html>)(pdf version (https://safe-frankfurt.de/fileadmin/user_upload/editor_common/Files/Data_Protection_Statement_10Jan2020.pdf))

I agree to the data protection statement.*

Subscribe

RECENT POLICY PUBLICATIONS

Apr 2020

Corona-Bonds und ihre Alternativen (<https://safe-frankfurt.de/policy-center/policy-publications/policy-publ-detailsview/publicationname/corona-bonds-und-ihre-alternativen.html>)

Marcel Thum, (https://tu-dresden.de/cdd/leitung_und_beteiligte/mitglieder/lebensraum-und-infrastruktur/Thum) Alfons J. Weichenrieder (<https://safe-frankfurt.de/research/researchers/researchers-details/showauthor/52-weichenrieder.html>)

Apr 2020

The Case for Corona Bonds (<https://safe-frankfurt.de/policy-center/policy-publications/policy-publ-detailsview/publicationname/the-case-for-corona-bonds.html>)

Matej Avbelj, (<https://www.eui.eu/DepartmentsAndCentres/Law/People/Fellows/BBF/Matej-Avbelj>) Antonia Baraggia, (<https://www.mmg.mpg.de/person/99018/2553>) Jürgen Bast, (https://www.uni-giessen.de/fbz/fb01/professuren-forschung/professuren/bast/team/prof_leitung) Bojan Bugarič, (<https://www.sheffield.ac.uk/law/staff/bbugaric/index>) Emanuel Castellarin, (<https://unistra.academia.edu/EmanuelCastellarin>) Francesco Costamagna, (<https://www.law.georgetown.edu/ctls/staff/francesco-costamagna/>) Anuscheh Faraha, (<https://www.oer5.rw.fau.de/prof-dr-anuscheh-farahat/>) Matthias Goldmann, (<https://safe-frankfurt.de/research/researchers/researchers-details/showauthor/549-goldmann.html>) Anna-Katharina Mangold, (<https://www.europeanstudies.info/en/about-ma-eus/our-team/administrative-team/prof-dr-anna-katharina-mangold-llm-cambridge/>) Mario Savino, (<https://unitus.academia.edu/MarioSavino>) Alexander Thiele, (<https://www.uni-goettingen.de/de/pd-dr-alexander-thiele/418590.html>) Annamaria Viterbo (<http://www.dg.unito.it/do/docenti.pl/alias?anna.viterbo#profilo>)

Apr 2020

Emerging Evidence of a Silver Lining: A Ridge Walk to Avoid an Economic Catastrophe in Italy and Spain (<https://safe-frankfurt.de/policy-center/policy-publications/policy-publ-detailsview/publicationname/emerging-evidence-of-a-silver-lining-a-ridge-walk-to-avoid-an-economic-catastrophe-in-italy-and-spa.html>)

Christopher Busch, (<https://safe-frankfurt.de/research/researchers/researchers-details/showauthor/468-busch.html>) Alexander Ludwig, (<https://safe-frankfurt.de/research/researchers/researchers-details/showauthor/112-ludwig.html>) Raül Santaaulàlia-Llopis (<https://www.barcelonagse.eu/people/santaaulalia-llopis-raul>)

All Policy Publications (<https://safe-frankfurt.de/policy-center/policy-publications.html>)

Contact

Leibniz Institute for Financial Research SAFE

Theodor-W.-Adorno-Platz 3
60323 Frankfurt am Main

Phone: +49 69 798 30080
Fax: +49 69 798 30077
Email: info@safe-frankfurt.de

Find the right contact person (<https://safe-frankfurt.de/about-safe/contact.html>)

 Follow us on Twitter (https://twitter.com/SAFE_Frankfurt)

SAFE →

- About SAFE (<https://safe-frankfurt.de/about-safe.html>)
- Job Offers (<https://safe-frankfurt.de/about-safe/career/job-offers.html>)
- How to find us (<https://safe-frankfurt.de/about-safe/how-to-find-us.html>)

Policy Center →

Research →

- Research Departments (<https://safe-frankfurt.de/research/research-departments.html>)
- Researchers (<https://safe-frankfurt.de/research/researchers.html>)
- Data Center (<https://safe-frankfurt.de/data-center.html>)

News & Events →

- [SAFE Senior Policy Fellows \(https://safe-frankfurt.de/policy-center/safe-senior-policy-fellows.html\)](https://safe-frankfurt.de/policy-center/safe-senior-policy-fellows.html)
- [Policy Publications \(https://safe-frankfurt.de/policy-center/policy-publications.html\)](https://safe-frankfurt.de/policy-center/policy-publications.html)
- [SAFE Finance Blog \(https://safe-frankfurt.de/news-latest/safe-finance-blog.html\)](https://safe-frankfurt.de/news-latest/safe-finance-blog.html)
- [Policy Center Team \(https://safe-frankfurt.de/policy-center/policy-center-team.html\)](https://safe-frankfurt.de/policy-center/policy-center-team.html)
- [All News \(https://safe-frankfurt.de/news-latest/all-news.html\)](https://safe-frankfurt.de/news-latest/all-news.html)
- [Newsletter \(https://safe-frankfurt.de/news-latest/newsletter.html\)](https://safe-frankfurt.de/news-latest/newsletter.html)
- [Expert List \(https://safe-frankfurt.de/press/expert-list.html\)](https://safe-frankfurt.de/press/expert-list.html)



[Home \(https://safe-frankfurt.de/footer-menu/home.html\)](https://safe-frankfurt.de/footer-menu/home.html) →

[About this site \(https://safe-frankfurt.de/footer-menu/about-this-site.html\)](https://safe-frankfurt.de/footer-menu/about-this-site.html) →

[Data Protection \(https://safe-frankfurt.de/footer-menu/data-protection.html\)](https://safe-frankfurt.de/footer-menu/data-protection.html) →

© 2020 SAFE