Why adding fuel credits to vehicle standards is a bad idea

T&E rebuttal of the German study by FlickGocke Schaumburg & Frontier Economics *Crediting system for renewable fuels in the EU emission standards for road transport*

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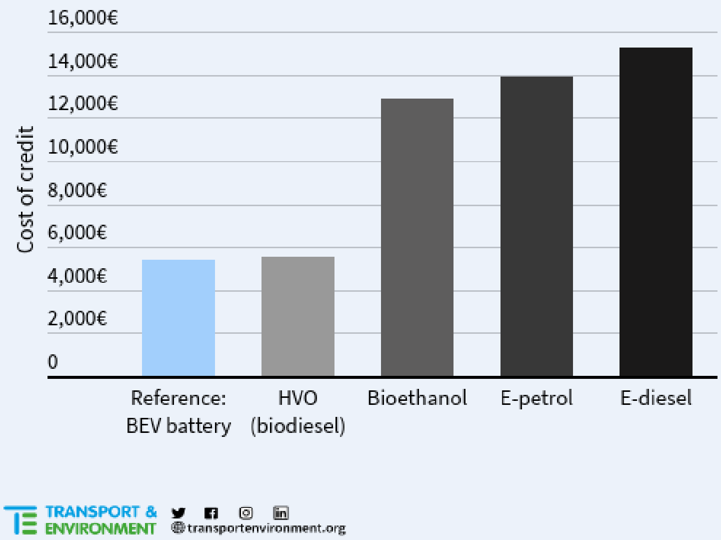
Summary

Adding credits for advanced and synthetic fuels into the EU vehicle CO2 standards has been suggested by the oil and gas industry for a number of years now. With the review of the standards expected in mid-2021, the push has intensified, including a new study commissioned by the German economic ministry. This short paper highlights the shortcomings of the study, showing this to be a futile, costly and ineffective regulatory approach.

First, to deliver climate objectives, regulations should be robust, targeted and effective. Car and truck CO2 standards work because they regulate what vehicle manufacturers have control over, i.e. powertrains. Fuel suppliers on the other hand are covered by the EU Renewable Energy and Fuel Quality Directives (RED II and FQD, respectively), where their remit - the fuel production and supply - is addressed. Adding fuel credits into the vehicle standards is a cumbersome approach mixing apples and pears, open to loopholes and double counting. Notably, while the German study addresses some duplication between vehicle standards and RED II, it fails to acknowledge either FQD or the additional national measures under the Effort Sharing Regulation (ESR). Both the FQD and ESR already credit the GHG reductions of sustainable alternative advanced fuels (SAAFs); the same as would be used by the proposed SAAF crediting system. The biggest risk comes from the proposed banking of fuel credits, whereby a carmaker can simply purchase fuel credits corresponding to its car sales in e.g. 2026-2029 (when no additional CO2 targets exist) and bank them all for compliance in 2030. This will seriously delay timely investments into zero and low emission technologies and slow down the transition to e-mobility, undermining further the current flaw of vehicle standards that are tightened only every 5 years .

Getting credits to comply with CO2 emission standards is also not environmentally sound. Zero emission cars such as battery electric vehicles (BEVs) emit zero CO2 (or pollution) from their exhausts. They are also on average 3 times better on lifecycle than diesel or petrol cars. Cars driven on biofuels or synthetic fuels emit similar levels of (tailpipe) CO2 and pollution as conventional cars. With no commercial production of synthetic fuels expected in 2020s - or robust sustainability criteria yet in place - crediting advanced fuels (as the study calls biofuels) will instead drive unsustainable crop biofuels such as soy or rapeseed, which are often worse on lifecycle when indirect land use impacts are included. Worse still, the study proposes to allow vehicles for which credits have been purchased to be designated as "zero or low emission vehicles" in registration documents even though no physical link between what these cars are fueled with can be established. This will render the ZEV definition empty with no real-world benefits, undermining the effectiveness of numerous EU, national and local regulations.

Cost of getting the fuel credit-equivalent to selling a zero emission vehicle



Crucially, SAAF is the least cost-effective path for carmakers, contrary to the affordability claims of the study. T&E calculations show BEV to be the cheapest compliance strategy in 2025. Even the biodiesel route - which is not compatible with the EU climate neutrality goal - is slightly more costly. Complying using e-diesel and e-petrol credits raises compliance costs two-to-three-fold, on top of being 4-5 times less efficient than the battery pathway.

Whether advanced or synthetic, fuels for road vehicles are a distraction from the optimal and future-proof zero emission pathway of direct electrification via batteries. Sales of electric cars are expected to reach 10% this year and rise to 15% in 2021. With e-mobility now a vital part of industrial strategy of many carmakers, fuel credits are a Trojan horse that would perpetuate the infernal combustion engines and derail the automotive transformation currently underway.

Introduction

The idea to add fuels into the vehicle CO2 emissions standards is not new, and has been heavily pushed by the oil and gas industry, supported by like-minded governments, during the last round of EU car & truck CO2 negotiations in 2017/18. The issue has resurfaced again now that the car CO2 standards will be reviewed in 2021 as part of the European Green Deal and higher 2030 ambition.

The German Federal Ministry for Economic Affairs and Energy (BMWi) has recently commissioned a report on how this can be done: Crediting System for Renewable Fuels in EU Emission Standards for Road Transport. The report advocates for synthetic and advanced alternative fuels (SAAF) to be included into EU vehicle emissions regulations and provides recommendations on how to do this. This short memo shows why these proposals lack environmental or economic credibility, and how such a system is still full of loopholes and double-counting, as previously shown by T&E.

In short, such crediting is futile and will result in CO2 savings on paper only, driving unsustainable biofuels and leading the road transport sector towards a costly compliance route compared to direct electrification via batteries.

1. No regulatory credibility

Double counting of emission reductions under RED, FQD & ESR

Any system that gives additional CO2 credits for fuels that are already mandated or supported by the EU Fuel Quality Directive (FQD), Renewable Energy Directive (RED II) or additional measures in the Effort Sharing regulation (ESR) cannot avoid double counting, stripping any such scheme of credibility.

While the REDII law credits the energy share of biofuels, the GHG reductions of these fuels are accounted for under the FQD. The FQD sets a decarbonisation target for fuel suppliers, requiring them to reduce the GHG emissions of their fuels by 6% by 2020; it will stay in place until 2030. So even if the report claims that it attempts to avoid double counting, the mechanism proposed only focuses on the REDII and fuels certificates to avoid duplication. However, it fails to analyse how the proposed system will relate to the GHG reductions/savings claimed under the FQD in the 2020s. No matter whether a fuel supplier counts the volumes of fuels under REDII or not, they still double count the emissions reductions with the FQD.

An additional double counting occurs due to the ESR framework, so we are triple counting the same fuel by this stage. Under the ESR biofuels are (wrongly) counted as zero emissions and used by member states to meet their national ESR targets (as additional measures on top of EU vehicle CO2 standards). The proposed crediting mechanism fails to avoid this problem, since the member states use the information on the type of fuels placed on their market, not whether these have already been counted towards manufacturers' EU targets.

Delaying the shift to (real) Zero Emission Vehicles via banking

The serious side effect of the proposed system will be to delay the necessary shift to electric vehicles by relying on (often unsustainable) biofuels or betting on synthetic electro-fuels which do not yet exist at commercial scale. The share of plug-in car sales is reaching 10% in 2020, expected to increase to 15% in 2021, a much faster shift than previously expected. Against this, there is no current mass production of renewables-based electro-fuels. Even when these ramp up, we urgently need those fuels to decarbonise hard to abate sectors where batteries cannot reach such as aviation, not waste them on cars, vans and trucks where the superior, more efficient and cheaper technologies to go zero emission already exist.

A serious weakening will come from allowing the banking of SAAF credits, as explained on pp. 34-35 of the report. This will allow carmakers to bank the (lifetime) credits from the vehicles they sell in e.g. 2026-2029 when no strict CO2 target exists to then use them all at once for the compliance in 2030 when a stricter target enters force. This will disincentive timely action to reduce emissions, will delay investments and transition towards electric powertrains, thus slowing down the transition to emobility currently underway. This is a potential "fuels get out of jail" card to avoid fines. Such banking will in effect further exacerbate the current flaw in the CO2 target design, whereby 5-year targets mean that progress is delayed until the last minute and profit-making heavy polluting car and van sales prioritised in the interim.

No power for countries to restrict bad biofuels

The EU renewables energy framework allows member states to go beyond the EU limits for crop based biofuels and set additional restrictions. However, a lack of clear geographical boundaries in the proposed crediting system would undermine the right of individual countries to limit the damage from unsustainable biofuels. The report claims that any European country can decide to restrict the list of admissible fuels, in which case "sustainability credits from fuels in a Member State which have been excluded by this country cannot be credited against the fleet targets".

However, this would only affect the fuel supplied in the member state which blacklists it; OEMs could still buy credits from the suppliers of this fuel with operations or supply network in a different country and credit it for all vehicles sold, including in the given member state with stronger restrictions. For example, the member state X bans fuel A to be purchased as credits from fuel suppliers for meeting its renewable and climate targets. A carmaker selling on the X's market can simply buy credits of fuel A from a fuel supplier in member state Y where no restrictions apply. The carmaker can therefore still reduce their fleet-wide target in the EU and include X's vehicle sales into the mix, even though X defines fuel A as unsustainable in its fuels market.

This de facto takes away the national power to limit unsustainable biofuels and allows carmakers to pick and choose EU-wide - disregarding the national restrictions - to meet their EU-wide CO2 targets.

2. No environmental credibility

The proposals to include not just synthetic, but also alternative fuels - read biofuels - would drive even more unsustainable crop biofuels into vehicles and exacerbate the environmental damage already caused by the existing EU biofuels targets in the EU Renewable Energy Directive (RED) & RED II. In fact - while keeping the RED II cap for crop-based biofuels - the German study fails to exclude first generation biofuels such as palm oil, soy or rapeseed from its proposals, despite their proven damage and many calls to ban these from the EU transport regulations.

Using some blended biofuel does not make a vehicle zero or low emission

As a rule across Europe, biofuels are currently blended at maximum 10% in petrol and 7% in diesel (there are some exceptions, such as in the case of Hydrotreated Vegetable Oil). Currently, no diesel or petrol combustion engine runs on 100% alternative liquid biofuels when it refuels at a petrol station. Because of the lack of availability of e-diesel, it is unlikely that a vehicle will run on higher shares of e-diesel any time soon either. And 7-10% blended advanced biofuels - even if they follow strict sustainability criteria - do not make the vehicle zero emission. At best, it is up to 10% less carbon intensive over its lifecycle than a conventionally fuelled diesel or petrol car, too small a benefit to be compatible with the EU carbon neutrality goals.

But even the 10% carbon improvement is on paper and not justified. The consultants' proposal makes no reference to indirect impacts when crediting the GHG savings of alternative fuels. This is a major loophole. For example, when accounting for indirect land use change (ILUC) emissions caused by displacement of food crops, crop biodiesel (majority of biofuels on the market in the EU today) would emit more GHG emissions than fossil fuels. Indirect emissions are also crucial to take into account when looking at 'advanced' biofuels produced from waste & residues: the displacement impacts of some feedstocks can be significant.

Zero emission vehicles - notably battery electric vehicles - emit zero CO2 or pollutant emissions from their tailpipe. A car run on blended biodiesel or bioethanol emits as much tailpipe CO2 as a comparable conventional one since fuel is still burnt in combustion; it also has considerable levels of pollutants. On lifecycle, electric cars are already on average three times cleaner than conventional cars, and blending up to 10% biofuels won't change that much. In fact, when accounting for biofuels' indirect CO2 emissions (via ILUC), their lifetime performance is expected to be even worse than conventional cars when using crop biodiesel. From a macro-level perspective when the wider land use effects are taken into account, most crop biofuels would therefore result in higher GHG impact than the fuels they are replacing. T&E will soon update its lifecycle tool to include such fuels.

There will be no physical correlation between the alternative fuels supplied in a certain place and the registration of cars across member states. In contrast, a fuel efficient or a zero emission vehicle sold today emits the same level of CO2 from its exhaust no matter where it is used across Europe, due to its on-set powertrain characteristics. Similarly on air quality: a low or zero emission vehicle has low or no air pollutant emissions, making a direct contribution to local air quality. Vehicles powered by alternative and synthetic fuels still have exhaust emissions which contain particulate matter, NOx and CO. While the amounts of particulate matter are likely to be lower than conventional fuels, the emissions of NOx are similar to fossil fuels and would require after-exhaust treatment technology.[1] The levels of CO and CO2 would be similar to fossil fuels.

Carmakers control car production and their design - they have no control over the location or country where the car drivers will fill up their vehicles. So in practice the CO2 reduction cannot be attributed to one vehicle manufacturer or individual vehicles. It is simply impossible to claim that such cars have any low emission properties in registration documents and claim related benefits (e.g. tax reductions), when in real life it is the same gas guzzling car as any other conventional powertrain. Thus giving OEMs the option to attribute low- or zero-emission properties in registration documents of an ICE vehicle whose lifetime emissions were offset by fuel certificates risks making the ZEV definition empty with no real-world benefits, undermining the effectiveness of numerous EU, national and local regulations.

The crediting system perpetuates the weak RED sustainability framework for transport fuels; and is based on future sustainability criteria not yet in place for synthetic fuels

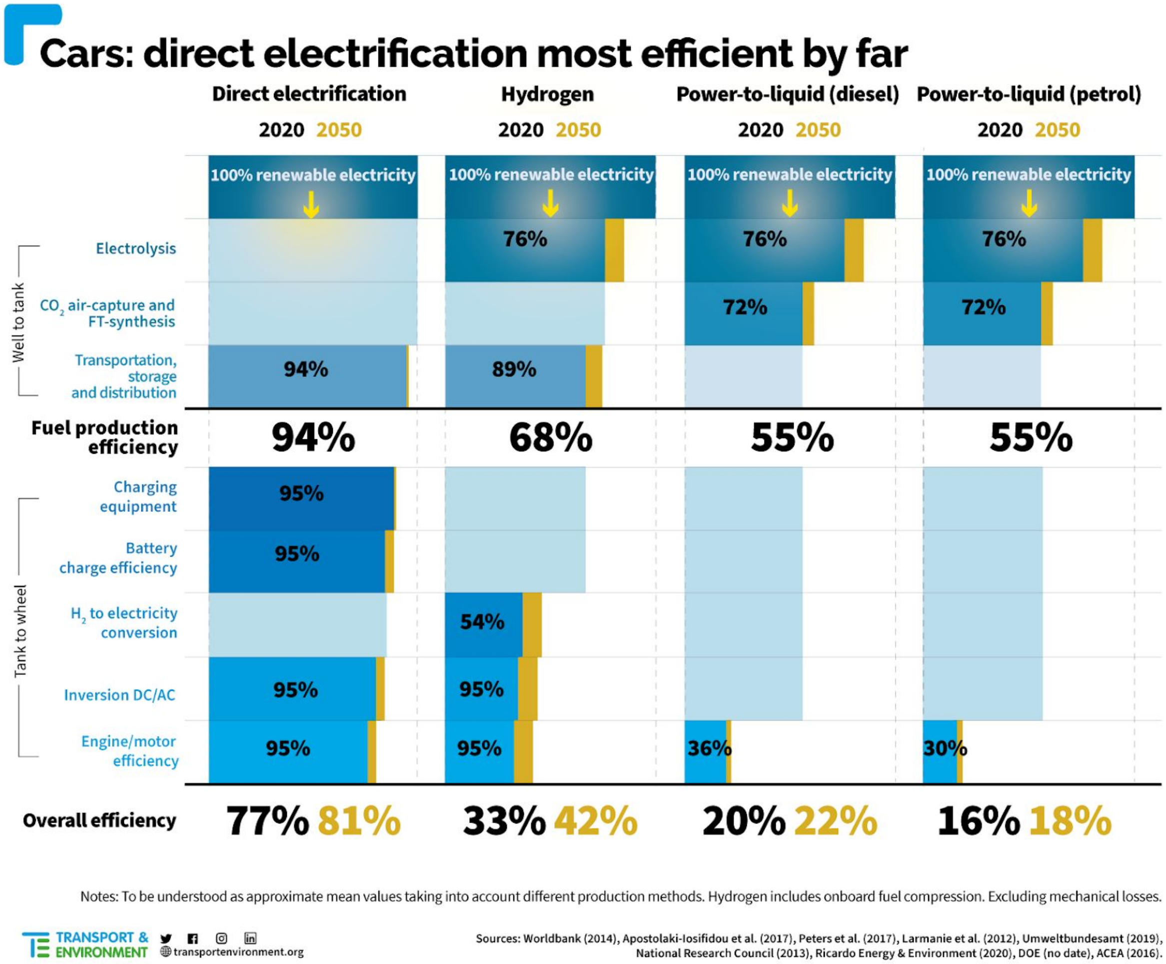
The current RED framework still allows for first generation biofuels such as palm soy and rapeseed that emit more GHG emissions than fossil fuels when ILUC emissions are included. To differentiate between those and following the RED II agreement, the Commission has started work to update the sustainability criteria, including a phase out of palm based biofuels by 2030, but it is far from complete and impossible to judge how effective it will be. The current sustainability criteria include several loopholes that allow for unsustainable feedstocks in the list of so called 'advanced' biofuels - to be

[1] O. Armas, K. Yehliu and A. Boehman, "Effect of alternative fuels on exhaust emissions during diesel engine operation with matched combustion phasing," Fuel, vol. 89, no. 2, pp. 438-456, 2010. M. Lapuerta, O. Armas, J. Hernández and A. Tsolakis, "Potential for reducing emissions in a diesel engine by fuelling with conventional biodiesel and Fischer–Tropsch diesel," Fuel, vol. 89, no. 10, pp. 3106-3113, 2010.

eligible for support (e.g. energy crops, tall oil, etc.) despite competing uses and potential issues on land use. Building on the current framework is not a proof of sustainability and cannot be used as the stamp of approval by any future fuel crediting system. Furthemore, the final sustainability framework for green hydrogen and synthetic fuels has not yet been agreed at EU level. Making reference to a future system that is not yet in place - and with no firm date for when it will be agreed - is dangerous and provides no environmental safeguards, so there should be no discussion of accepting such SAAF credits at this stage.

3. Least cost-effective option

Electrifying cars directly using batteries is the most optimal zero emissions path from an efficiency point of view. With the whole economy relying on renewables, “efficiency first” matters. Using less renewables is also most optimal as regards cost-effectiveness towards the energy system. The figure below summarises the well-to-wheel efficiencies of the different renewable pathways available; it excludes biofuels as they are not compatible with EU’s climate neutrality objectives. It shows that direct electrification is around 4 to 5 times more efficient than using synthetic e-fuels to decarbonise light-duty vehicles.



Another important consideration are the carmakers' compliance costs with their fleet-wide targets using either electric cars or advanced and synthetic fuels. T&E has estimated how much investing into a battery electric vehicle vs buying fuel credits would cost, comparing the cost of a battery electric, bioethanol, biodiesel (HVO), e-petrol and e-diesel "compliance credit" in 2025. The tables below summarise the assumptions to perform this analysis. Note that bioethanol has a blending limit with petrol and higher blends require the ICE engine to be modified. We show a 100% blend only in order to compare the compliance costs across fuels and drivetrains.

Parameters	Petrol car	Diesel car	Battery electric car

Annual mileage[2]	225,000 km p.a.		-
Fuel consumption (WLTP)[3]	5.2 L/100 km	5.2 L/100 km	-
Nominal battery capacity	-		60 kWh
Glider costs	Same for all three powertrains		
Battery pack costs[4]	-		EUR 90/kWh

Fuel type	EUR/Litre in 2025 (excl. taxes & levies)
Fossil petrol	0.46
Fossil diesel	0.53
Hydrotreated vegetable oil (HVO) from used cooking oil	1.00
Cellulosic ethanol from agricultural residues	1.56
E-petrol	1.65
E-diesel	1.83

[2] European Commission 2020). Determining the environmental impacts of conventional and alternatively fuelled vehicles through LCA. Retrieved from https://op.europa.eu/en/publication-detail/-/publication/1f494180-bc0e-11ea-811c-01aa75ed71a1

[3] 2025 ICE average estimated based on: 130 g/km WLTP in 2021 and 1.5% ICE fuel efficiency improvement per year between 2021 and 2025. More details : transenv.eu/2020carCO2report

[4] BNEF lithium-ion battery forecast assumes a pack price of 94 $/kWh in 2024 (or 80€/kWh). Conservatively, T&E has assumed 90€/kWh in 2025. https://about.bnef.com/blog/behind-scenes-take-lithium-ion-battery-prices/. For BEV, the savings from not having an ICE and gearbox/simpler drivetrain are not included.

Fuel cost assumptions

The fossil petrol and diesel cost represents the 2019 average before taxes & levies.[5] The cost of hydrotreated vegetable oil (HVO) produced from used cooking oil (UCO) is based on de Jong.[6] The cost of cellulosic ethanol from agricultural residues is also based on the ICCT.[7]

The Agora PtG/PtL calculator was used to calculate the levelised cost of electricity (LCOE) and the cost of synthetic e-petrol and e-diesel excluding taxes & levies based on the reference scenario.[8] The electricity generation and fuel production facilities are based on solar PV in North Africa. The chosen weighted average cost of capital (WACC) is 6% and the method of CO2-extraction is direct air-capture (DAC). Solar PV in North Africa was set at a load factor of 2,344 full-load hours per year. High-temperature electrolysis as well as FT-synthesis were set at 4,000 full-load hours and, thus, rely on temporary hydrogen storage.

The transport and distribution costs are based on Fasihi et al. and take into account transport via tanker vessels from North Africa (Algiers) to the Port of Hamburg and domestic distribution to the refuelling station via conventional tanker trucks.[9]

The analysis shows that direct electrification, i.e. battery electric vehicles, is the cheapest compliance strategy in 2025. Biodiesel is not a climate-compatible pathway for road transport given the sustainability and wider indirect GHG concerns; and even when a remotely acceptable advanced biodiesel technology pathway is considered, it is more expensive. In 2025, the compliance cost of a BEV is estimated to be around EUR 5,400, compared to EUR 5,556 for a HVO biodiesel (+3%), 12,877 for bioethanol (+138%), EUR 13,930 for e-petrol (+158%) and EUR 15,267 for e-diesel (+183%). Complying using battery technology is therefore 2.5-3 times cheaper in 2025 than using synthetic fuels, as well as most efficient. The difference in costs is expected to be even higher in 2030 with battery technology reaching cost parity with internal combustion engine cars.

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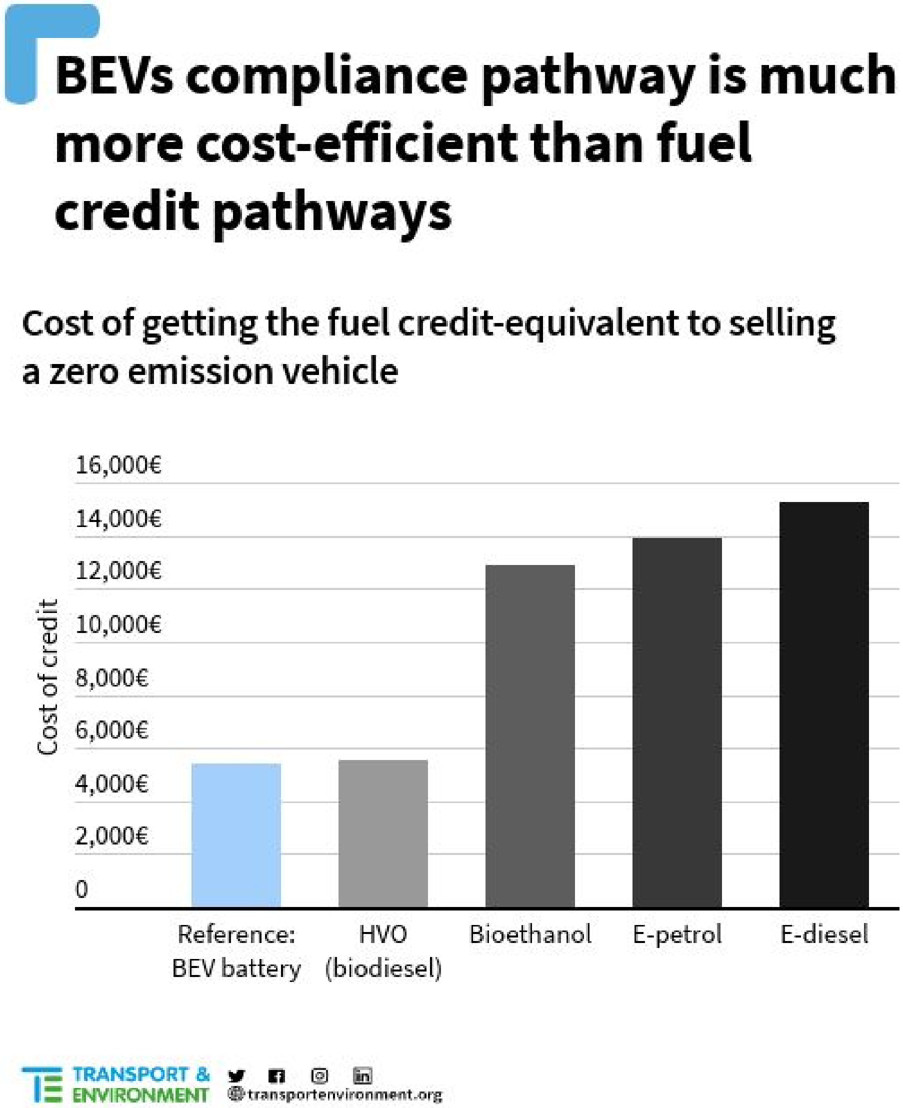
[5] Destatis (2020). Daten zur Energiepreisentwicklung - Lange Reihen bis September 2020. Retrieved from https://www.destatis.de/DE/Themen/Wirtschaft/Preise/Publikationen/Energiepreise/energiepreisentwicklung-pdf-5619001.html

[6] De Jong (2018). Green Horizons: On the Production Costs, Climate Impact and Future Supply of Renewable Jet Fuels. Retrieved from https://dspace.library.uu.nl/bitstream/1874/364514/1/dJong.pdf

[7] Pavlenko et al. (2019). Assessing the potential advanced alternative fuel volumes in Germany in 2030. Retrieved from https://theicct.org/sites/default/files/publications/Advanced_fuels_potential_Germany_20190916.pdf

[8] Agora Verkehrswende et al. (2018). PtG/PtL calculator. Retrieved from https://www.agora-energiewende.de/en/publications/ptg-ptl-calculator/

[9] Fashihi et al. (2016). Techno-Economic Assessment of Power-to-Liquids (PtL) Fuels Production and Global Trading Based on Hybrid PV-Wind Power Plants. Retrieved from https://www.sciencedirect.com/science/article/pii/S1876610216310761, various pages.



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