IASTEC
international association of sustainable drivetrain and vehicle technology research

SECTION EUROPE

Napoli, Valencia, Athens, Göteborg, Poznan, Hamburg, Karlsruhe, June 27th 2022

Members of European Council
Representatives of EU countries

Subject: ***Information about calculus of CO_2 emissions and clear failure to meet the target for reducing CO_2 emissions; request for elaboration of a balanced regulation***

Dear Ladies and Gentlemen,

the signees of this letter thank you for your ambitious efforts to reduce the CO_2 emissions in the near and distant future[1]. The intergovernmental panel of climate change (IPCC) has emphasized in its 2018 report, that the complete mankind is allowed to emit only 420 Gt_{CO2} in order to limit the global warming by 1,5°C. A quick, effective reduction of CO_2 emissions is therefore important.

Signees and supporters of this letter already have informed important representatives of different institutions in Europe in the last months and years and emphasized major concerns about the suggested legislation to reduce CO_2 emissions, especially in the sector of mobility[2].

The supporters of this letter typically had or have been working as lectures and instructors at universities all over the world as experts in the field of energy conversion, thermodynamics, energy transfer or energy balancing. Most of these supporters are experts in the course of studies of mechanical engineering, process engineering or chemistry engineering, which are the studies with the deepest and most intensive focus on major kinds of energy balancing.

The signees in combination with hundreds of supporters of this letter again want to repeat their criticism, that a serious miscalculation (averaging bias) in the analyses of CO_2 emissions caused by all electrical consumers is obviously influencing political initiatives. Above all, the misdirection leads to significantly increased CO_2 emissions. For basic explanation, please take our example (see Table 1, page 2). We therefore repeat our clear criticism that the elaboration[3] which has been taken as a basis for the preparation of a CO_2-roadmap is without physical basis and thus wrong! The real CO_2 emissions of all electrical consumers (including BEV[4]) are significantly higher than those of the inadequate average-value based approach, leading to the significant averaging bias.

Even future technology potentials like the increasing possibility of electrical energy storage in surplus times do not change the fundamental fact that the approach of calculation is unsuitable (Table 2 on page 3). Electrical storage capacities improve the situation but don´t solve the problem. Nor does a modification of the composition of energy carriers (coal subsidized by gas) for power plants change the fundamental error.

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[1] For questions regarding status of IASTEC please contact: landry.cochard@scinnov.eu
[2] i.e. Open letter to the European Parliament and the European Council on the risk of failure to meet long-term climate protection goals in the transport sector due to insufficient legal regulations, April 19th 2022 as well as June 17th, 2021 by T. Willner, A. Günther and supporters
[3] https://ec.europa.eu/clima/system/files/2020-09/2020_study_main_report_en.pdf
Final Report for the European Commission, DG Climate Action:
Determining the environmental impacts of conventional and alternatively fuelled vehicles through LCA, 2020, Final Report for the European Commission, DG Climate Action;
Please see criticized Figure ES5 of the mentioned publication[2] (page 9):at the end of this letter
[4] BEV: battery electrical vehicles

Daughter Eve has *a total financial need of 6000€/a to finance her studies*.	The national economy has *the total electrical energy demand* of 600TWh/a.
Eve supports through *own jobs:* 40% (2400 €/a) or in another case even 80% (4800 €/a) can be contributed.	*Photovoltaics and Wind*[5] support: 40% (240 TWh/a) or in another case 80% (480 TWh/a) are supplied.
The parents support Eve and have to pay for the remaining costs: 60% (3600 €/a) or even only 20% (1200 €/a) in the second case.	Fossil power plants have to fill the gap, therefore 60% (360 TWh/a) or even only 20% (120 TWh/a) must be contributed.
The total financial need is now increased by **100 €** due to additional costs (software, cloud, mobile phone, ...) ending up with total cost of 6000 €/a+**100 €/a** = 6100 €/a.	The national economy requires additional electrical energy because of additional electrical consumers (BEV) of **10 TWh/a**, in total 600TWh/a+**10 TWh/a** = 610 TWh/a.
Eve´s own contribution remains the same!	The contribution of *green energy*[5] remains!
The parents again must fill the gap: 3700 €/a (3600 €/a **+ 100 €/a**) or 1300 €/a (1200 €/a **+ 100 €/a**)	The fossil power plants must now deliver: 370 TWh/a (360 TWh/a **+ 10 TWh/a**) or 130 TWh/a (120 TWh/a **+ 10 TWh/a**)
The additional costs of **100 €/a** must be completely borne by the parents, in both cases, no matter how high *Eve´s own contribution* is.	The additional energy of **10 TWh/a** must be entirely provided based on fossil energy, even in the case of a higher contribution of *green energy* (80%, 480 TWh/a).
However, the analysis, which is the basis for the EU decision, figuratively calculates additional costs for the parents of only: 100 €/a * 60% = **60 €/a** or 100 €/a * 20% = **20 €/a**	According to Figure ES5 of the mentioned publication[3], the analysis calculates the required additional fossil energy: 10 TWh/a * 60% = **6 TWh/a** or 10 TWh/a * 20% = **2 TWh/a**
A total of 100 €/a must be paid additionnally by the parents in both cases. A significant and severe balancing error (factor 5) exists!	**A total of 10 TWh/a must be delivered additionally by fossil power plants!** Also here an inacceptable balancing error (factor 5) exists!

Table 1: examples of averaging bias as a consequence of average-value based analysis leading to a result of 20 €/a instead of 100 €/a (left column), respectively 2 TWh/a instead of 10 TWh/a (right column)

Please read our key messages of page 4, which summarize consequences coming out of the criticized analysis and inform about important aspects of complementary road maps.

We expressly emphasize that we recommend the intensive further development of BEV technology for numerous applications. At the same time, we urgently need technology freedom for the best possible CO_2 reduction including a much more ambitious increase of non-fossil based reFuels as blending components of fuel.

The crucial question is whether the EU wants to ban thermodynamic energy conversion based on chemical energy storage for individual mobility (IC ban) or whether it wants to save CO_2 as quickly and as much as possible in both the short as well as the long term! Optimal CO_2 reduction is definitely not achieved by a simple IC ban!

Therefore we kindly request you not to vote for a simple IC ban but to develop a balanced regulation which additionally considers all aspects of mobility with relevance to society, economy and above all environment. In other regions of the world reFuels are mandatory for a sustainable energy system.

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[5] Photovoltaics and Wind etc. is called "*green energy*"

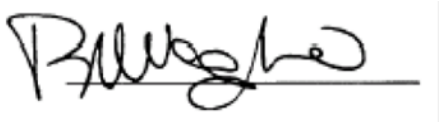
Eve's work for a scrap metal company enables additional income.	Electrical storage enables an additional increase of utilization of green energy.
Every 6th day of her work she is allowed to take home as much scrap metal as she can carry and get the proceeds for free.	Every 6th hour after the year 2030 *green energy* supplies at least 100% of electrical energy "for free" (excess electrical energy).
Eve buys the best backpack and carries home as much scrap metal as possible.	National economy invests into electrical energy storage capacities.
Eve already earns 4800 €/a and additional proceeds of scrap metal enable (1220 €/a) 4800 €/a + 1220 €/a = 6020 €/a Eve can even pay her study! 0% money of parents is required	*Green energy* already enables 480 TWh/a and electric. storage additional 122 TWh/a: 480 TWh/a + 122 TWh/a = 602 TWh/a Enough green electricity is available. 0% fossil energy is required.
The cost increase by 100 €/a from 6000 €/a to 6100 €/a. Again, the parents must support Eve.	Additional electrical energy of 10TWh/a is required. Again, fossil energy must support the electrical grid.
The parents must support **80 €** out of 100 €, although 100% of the cost were covered by Eve before cost increase! The averaging bias erroneously defines **expenses of the parents of 0 €!**	Fossil power must supply **8 TWh/a** out of 10 TWh/a, although 100% is supplied by "green energy" before increase of energy demand. The averaging bias falsely defines **0% fossil contribution (0 TWh/a)**!

Table 2: Enhanced example, considering the possibility of energy storage, of averaging bias leading to a result of 0 €/a instead of 80 €/a (left column), respectively 0 TWh/a instead of 8 TWh/a (right column)

Of course, we repeat our willingness to support you in the process of accomplishing the best possible regulation in order to quickly and efficiently reduce CO_2 emissions.

Yours sincerely

South-West Europa
Prof. Jesus Benajes



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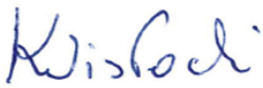

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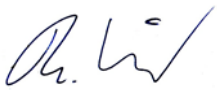

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The following key messages summarize the content of our letter.

A. The EU ambitions to quickly reduce CO_2 emissions are highly appreciated.

B. However, the calculation of CO_2 emissions of an electrical demand according to the highly criticized standard approach is useless and misleading[6]. This criticized standard calculation (*i.e. 20kWh/100km multiplied by an average CO_2 footprint of 360 g_{CO2}/kWh*[7] *resulting into 72 g_{CO2}/km*) underestimates real CO_2 emissions of an electrical demand by far, as mostly fossil power plants (range between 500 to 1100 g_{CO2}/kWh) typically need to supply this demand in addition to the normal electricity. The CO_2 impact of electric consumers therefore is clearly higher than calculated (see Table 1, page 2)[8].

C. Electrical energy storage possibilities improve the situation, but the analysis according to above explained **B.** remains wrong (see Table 2, page 3).

D. Before evaluating a technology ban, it is very important to determine the environmental impact reliably on the basis of a correct and systemic analysis.

E. A quick CO_2 reduction is only possible in combination with complementary alternatives to electro-mobility like low CO_2 reFuels (bioFuels, eFuels) also with respect to defossilisation of the existing fleet! An intelligent mix of technologies (BEV, refuels) will enable a best overall CO_2 reduction[9].

F. A well-designed hybrid drivetrain in combination with reFuels-blends (i.e. R33, G40) enables a CO_2 reduction potential significantly below 100 g_{CO2}/km (~-50% of today's benchmark). A hybrid technology strategy will be standard in the future in order to further reduce the CO_2-emissions. Also after the year 2040 we cannot afford to leave out any solution to reduce CO_2 emissions!

G. The large-scale production of reFuels will enable costs below 1 €/l and ensure a fair option especially for people with low income[10].

H. Overall from the scientific point of view a renewable Fuel path (refuels) is sustainable and environmentally friendly.

I. In the case of a "BEV-only strategy", we are heading into a clear state of dependency, especially on materials and processes from China and other regions of the world.

J. Modern ICE[11] drivetrains (as of $EU6_{dtemp/dfinal}$) can be assumed to be close to immissions neutral.

K. Many socially important transport solutions depend on ICEs i.e. civil protection, military, fire fighting vehicles, rescue and ambulance vehicles, tractors, harvesters, heavy duty construction and working machines, etc. These will become significantly more expensive if the upstream innovation performance of the automotive industry is lost.

L. Many OEMs (i.e. Audi, BMW, Honda, Geely, Mazda, Porsche, Renault, Skoda, Stellantis, Toyota, Renault, Volkswagen) did not sign the Cop26 Glasgow call for a ban of the ICE! The ICE knowledge would be lost in Europe and be transferred to other continents in case of an ICE-Ban in Europe.

M. Technology-open states such as China intensively follow the path of CO_2 neutral reFuels in conjunction with other technologies.

N. Freedom of technology remains an important pillar of our common good and future and must be ensured by a balanced and wise regulation.

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[6] In essence, the criticism addresses the difference between average costs and marginal costs and every analysis with average costs underestimates the real environmental relevance of marginal costs (costs/taxes are comparable to CO_2 emissions).

[7] The average CO_2 footprint of an electricity system is assumed to be 360 g_{CO2}/kWh in this example.

[8] Every electrical consumer acts as an additional consumer, an old fridge in the basement as well as a new server/BEV/heat pump. Switching off each consumer would typically reduce the need of fossil based electrical energy.

[9] The additional energy demand of eFuels in comparison to a BEV utilization is by far not as critical as claimed. Indeed 2-3 times more electrical energy is required in the case of eFuels, but on the other hand side favorable worldwide locations enable high efficiency of photovoltaics and wind (2-4 times higher than average European locations) and must be considered as well. Even more important, the energy storage and availability problem will be solved with eFuels.

[10] Hydrogen treated vegetable oil (HVO) is well established and cost are well known. eFuel cost depend on the prize of electric energy. Low energy cost in the range of 1 €Cent/kWh enables very low efuel cost below 1€/l.

[11] ICE: internal combustion engine, ICEs will basically build a Hybrid drivetrain in the future together with an electric motor.

Especially the decisive statements **A.-D,** of the key messages with a clear emphasize of the importance of statement **N**. as a consequence of a comprehensive analysis is supported by:

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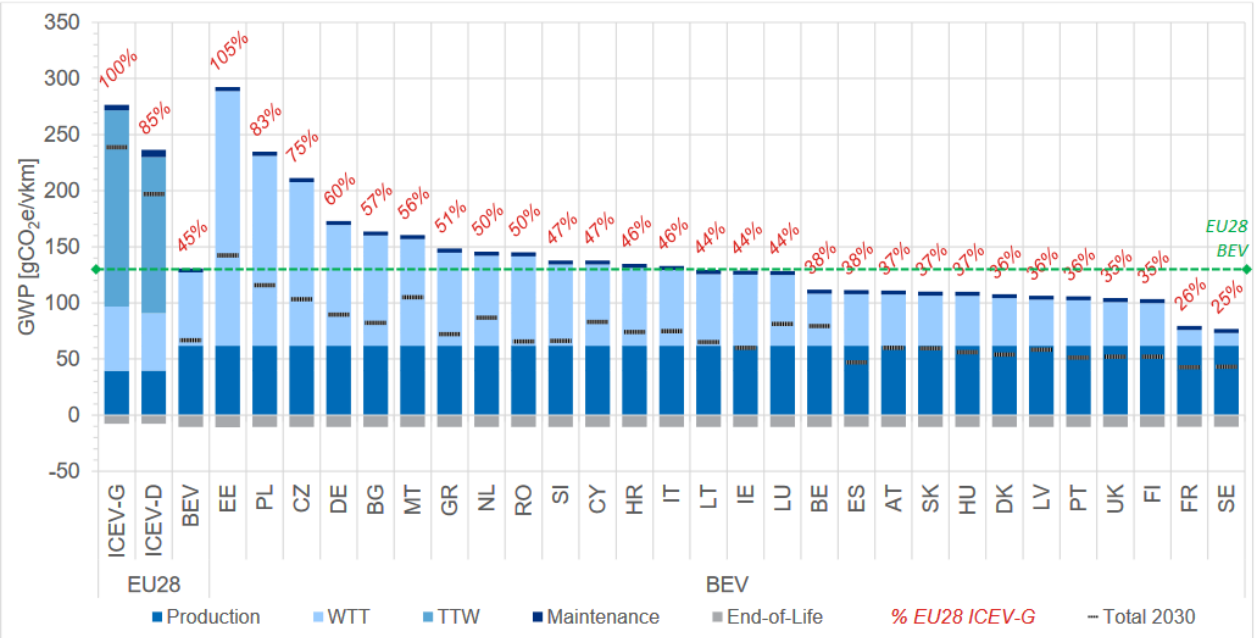
314. In addition, we would like to point out that a parallel initiative of the undersigned Prof. T. Willner with further 183 supporters from Academia (note: a couple of double nominations in comparison with above list exist), mainly from the field of process and chemical engineering as well as natural sciences, also emphasizes the necessity of a correct CO_2 analysis and considers a freedom of technology as crucial.

Attachment

Criticized Figure ES5 of the mentioned publication[2] (page 9):

Figure ES5: Comparison of Lower Medium Car lifecycle GWP impacts for conventional gasoline/diesel ICEVs and BEVs for different EU countries, Baseline scenario. Breakdown shown for new 2020 vehicles, and the total only for new 2030 vehicles.



Notes: Results shown for the lower medium car in the baseline scenario. Production = production of raw materials, manufacturing of components and vehicle assembly; WTT = fuel/electricity production cycle; TTW = impacts due to emissions from the vehicle during operational use; Maintenance = impacts from replacement parts and consumables; End-of-Life = impacts/credits from collection, recycling, energy recovery and disposal of vehicles and batteries. Additional information on key input assumptions and derived intermediate data include the following: a lifetime activity of 225,000 km over 15 years. 2020 BEV battery of 58 kWh, with 300km WLTP range (and with 64 kWh and 460 km WLTP electric range for 2030); an average lifetime EU28 fuel/electricity mix (age-dependant mileage weighted). No battery replacement is needed for BEVs.