www.oeko.de

Working Paper

Considerations on the further development of the EU car label

Oeko-Institut Working Paper 6/2025

Moritz Mottschall, Katharina Göckeler, Dennis Seibert (Öko-Institut)
Jan Dornoff, Kyle Morrison (ICCT)

Öko-Institut Consult GmbH
info@oeko-consult.de
oeko-consult.de

Freiburg Office
P.O. Box 17 71
79017 Freiburg
Germany
Phone: +49 761 45295-0

Darmstadt Office
Rheinstraße 95
64295 Darmstadt
Germany
Phone: +49 6151 8191-0

Berlin Office
Borkumstraße 2
13189 Berlin
Germany
Phone: +49 30 405085-0

Working Paper

Considerations on the further development of the EU car label

Moritz Mottschall, Katharina Göckeler, Dennis Seibert (Oeko-Institut)

Jan Dornoff, Kyle Morrison (ICCT)

Working Paper 6/2025 Oeko-Institut

September 2025

Download:
www.oeko.de/fileadmin/oekodoc/WP-Considerations-further-development-EU-car-label.pdf

The working paper was prepared as part of the project “Need for action and options for regulating the electricity consumption of electric vehicles (Handlungsbedarf und Optionen zur Regulierung des Stromverbrauchs von Elektrofahrzeugen)” commissioned by the Federal Environment Agency (FKZ 3724 57 701 0).

Oeko-Institut’s Working Paper Series is a collection of research articles written within the scope of the institute’s research activities. The articles present and discuss innovative approaches and positions of current sustainability research. The series is open to work from researchers of other institutions. The Working Papers are produced in a scrupulous scientific process without external peer reviews.

Table of Contents

List of Figures

List of Tables

1 Background and objectives

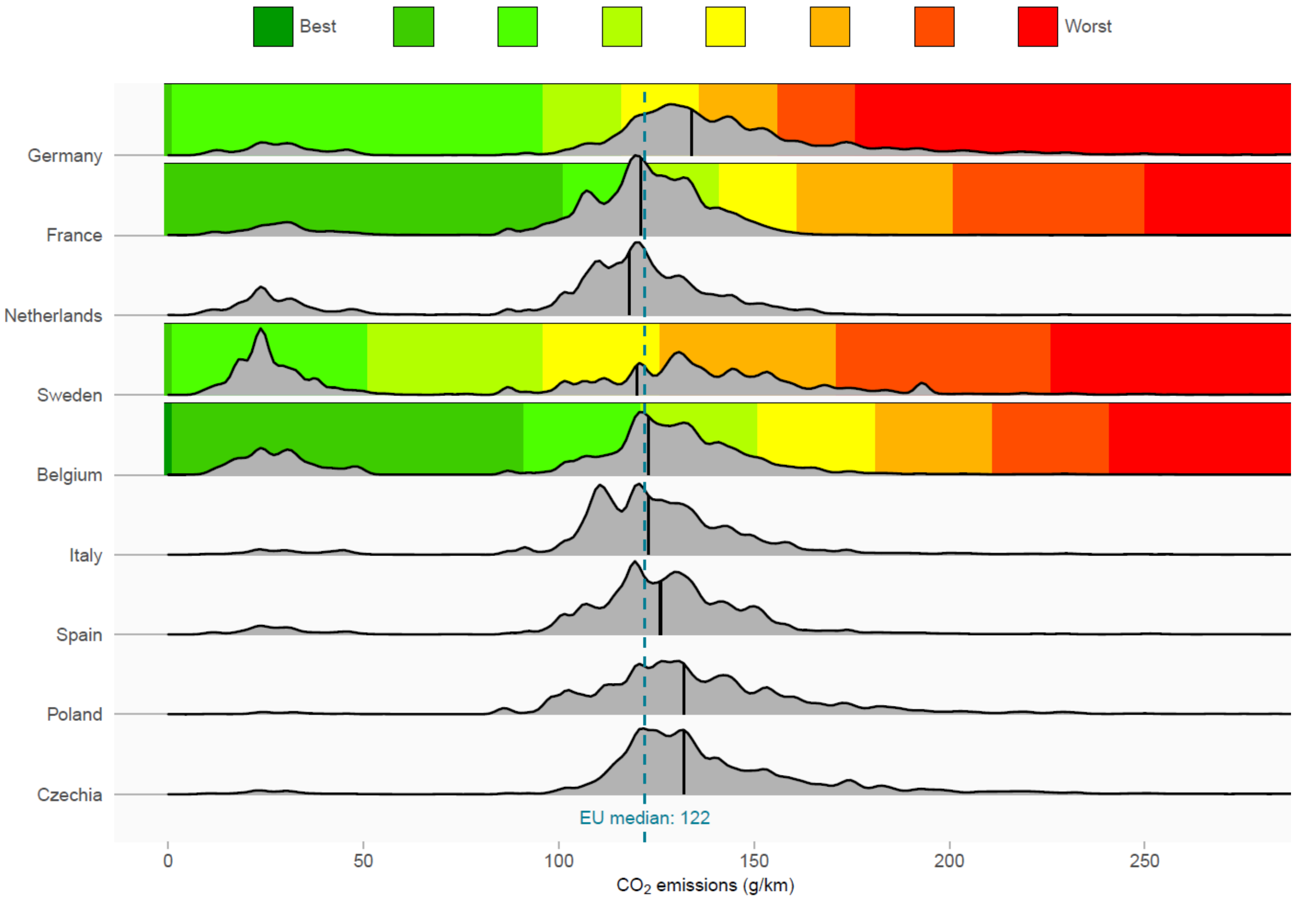
In the foreseeable future, the electric energy consumption of battery electric vehicles (BEVs) will represent a substantial share of the total electric energy demand in the EU. Already for 2030, the International Energy Organization projects that electric cars and vans will be responsible for about 2.9 % of Europe's total electricity consumption (International Energy Agency 2025). With the goal to minimize the energy demand from electric cars and vans, this report analyses how the car label could be redesigned to raise consumer awareness on BEV efficiency and, thereby, potentially increase the demand for vehicles with a lower energy consumption.

The current car label informs consumers about the fuel economy and CO_2 emissions of new passenger cars that are offered for sale or lease in the European Union (EU) (EU directive 1994/94). This enables consumers to make an informed purchase decision, which incentivizes car manufacturers to produce more efficient cars. However, the implementation of the Car Labelling Directive by the Member States resulted in heterogenous label designs (Ricardo 2016, Dena 2024, European Commission 2025), since only a few parameters are mandatory for display which include the numerical value of the fuel consumption and the CO_2-emissions per kilometre.

Going beyond these minimum requirements, 13 out of 27 Member States rate the vehicles based on their CO_2 emissions using a graphic representation similar to the EU energy label widely known for other energy-consuming products (Dena 2024, Ricardo 2016). However, the number of classes and definition of class boundaries differ between Member States. Furthermore, some Member States rate the vehicles based on their absolute CO_2 emissions while others compare vehicles relative to reference vehicles with similar characteristics. As a result, the same vehicle model may be assigned to different CO_2 classes in different Member States producing confusion for consumers and an additional bureaucratic burden for manufacturers and dealers.

Based on the CO_2 monitoring data of light duty vehicles registered in the EU, annually collected and published by the European Environment Agency (EEA), **Figure 1-1** shows the distribution of CO_2 emissions of combustion engine passenger cars registered in the years 2022 to 2024 compared to car label CO_2 classes for selected EU countries that rate all vehicles based on the absolute emission values.

Figure 1-1: Distribution of official CO_2 emission values of combustion engine passenger cars, including plug-in hybrid vehicles, registered in 2022 to 2024. Based on the CO_2 monitoring dataset published by the European Environment Agency. For EU countries using a CO_2 classification system, CO_2 classes are shown as a coloured background.



Source: ICCT

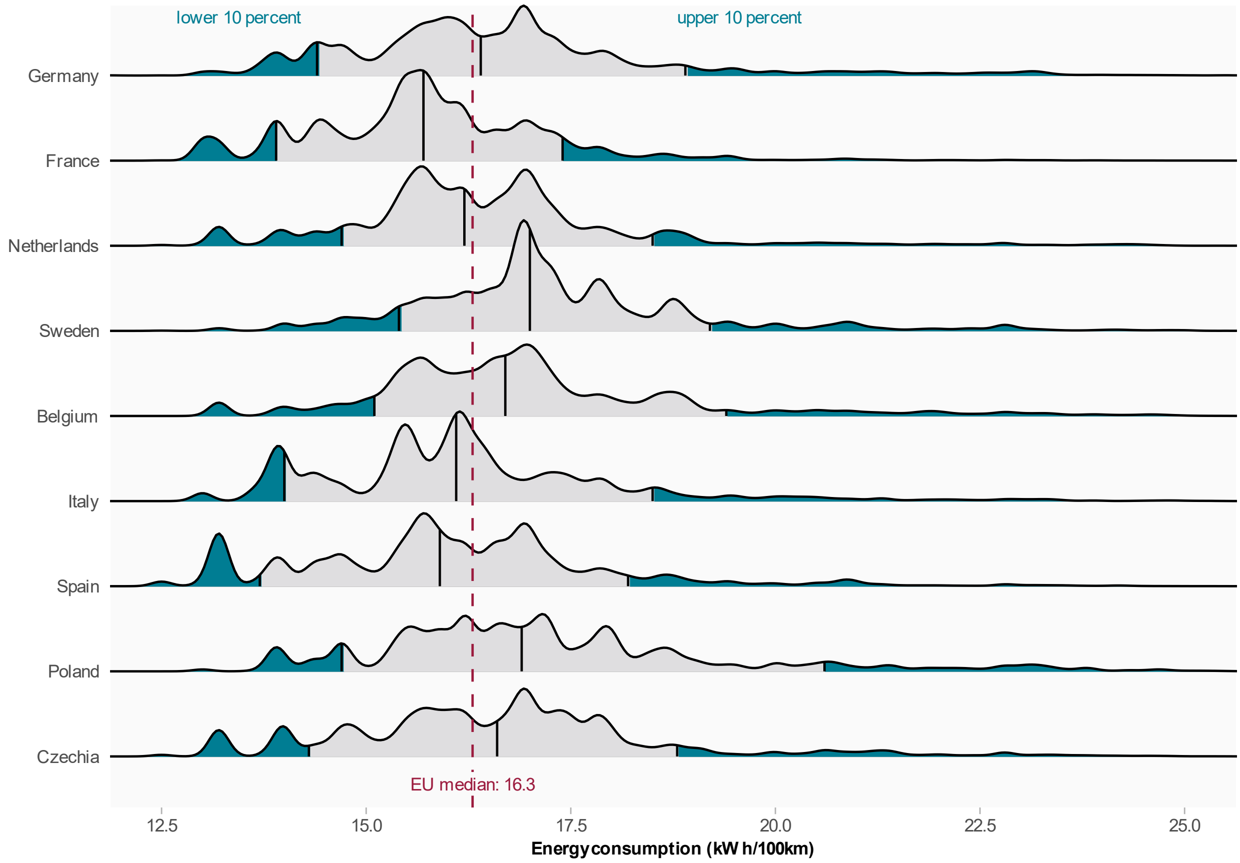
Most Member States also provide additional information on the car label. For example, Germany, Denmark, Estonia, and Finland display operating cost estimates for the consumer, while France, Belgium, and Finland add information on pollutant emissions (Dena 2024).

A shortcoming of the current directive and its implementation by Member States is the missing link to electric vehicles. In countries where CO_2 or fuel consumption classes are used, all battery electric vehicles are consequently assigned to the best class inhibiting consumers to make an informed purchase decision based on the level of energy consumption.

Figure 1-2 shows the distribution of the energy consumption of battery electric vehicles registered from 2022 to 2024 for selected EU countries, as reported in the EEA monitoring data. After excluding the one percent of vehicles with the lowest and highest levels of energy consumption to avoid potential outliers, the energy consumption of all battery electric vehicles (BEVs) registered in the EU in these years stretches across a broad range from about 14 kWh/100 km up to 28 kWh/100 km.[1]

[1] For PHEVs, the electric energy consumption in charge depleting mode ranges from 17 kWh/100 km to 39 kWh/100 km, calculated from the weighted, combined energy consumption and the utility factor, estimated based on the equivalent all electric range.

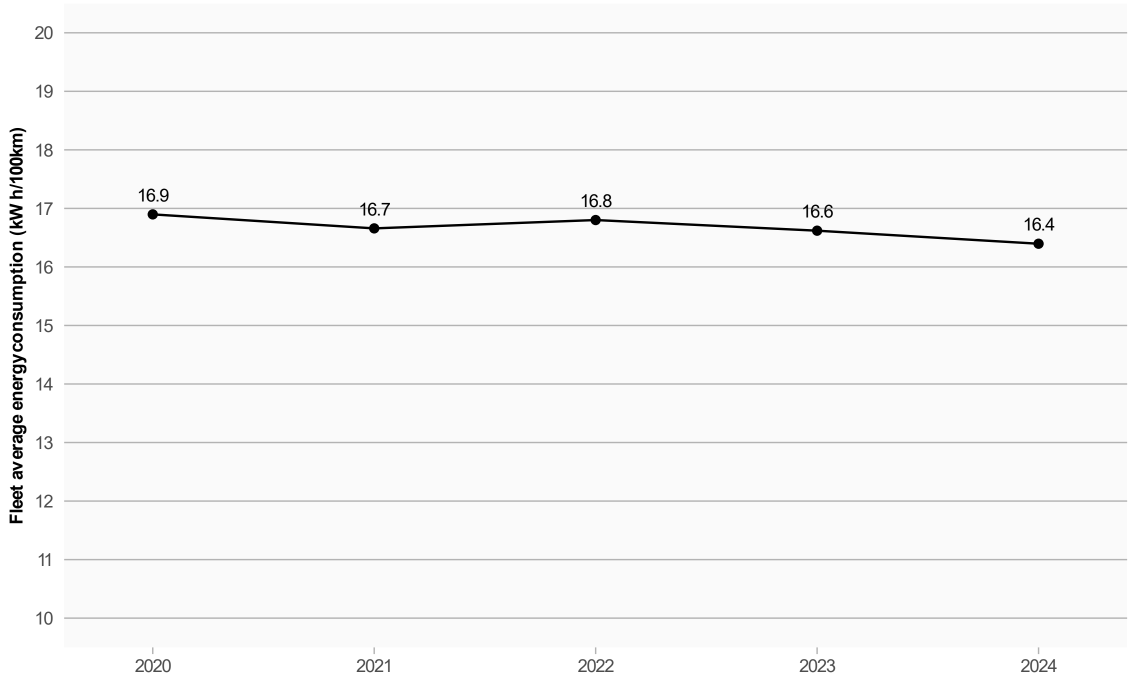
Figure 1-2: Distribution of the energy consumption values of battery electric vehicles registered in selected EU countries from 2022 to 2024. Based on the CO_2 monitoring dataset published annually by the European Environment Agency.



Source: ICCT

Since CO_2 emissions of new vehicles are subject to gradually tightening fleet targets, there is no mechanism in place for limiting vehicles' electricity consumption. In fact, the fleet average electric energy consumption of battery electric vehicles is almost stagnating across the EU since 2020, dropping by only about 0.75 % per year (Figure 1-3). A label that also considers the energy consumption for the rating of vehicles may result in consumers opting for more efficient vehicle models, thereby incentivizing manufacturers to lower their vehicles' energy consumption.

Figure 1-3: Fleet average energy consumption of battery electric vehicles registered in the EU from 2020 to 2024 based on the CO_2 monitoring dataset published annually by the European Environment Agency.



Source: ICCT

The European Commission's 2025 evaluation of the Car Labelling Directive has identified several areas for improvement. The variation in national implementation reduces the directive's effectiveness and increases costs for manufacturers. A harmonized label design would potentially lower the label costs and make it more recognisable across the EU. The evaluation also recommends shifting towards digital information tools, reflecting the growing importance of online platforms for car buyers. Furthermore, the evaluation highlights that the current implementation of the Car Labelling Directive does not adequately serve buyers of light commercial vehicles and second-hand cars. Notably, the evaluation finds that *"[the] Directive's focus on fuel consumption and tailpipe CO_2 emissions is geared towards buyers of cars with an internal combustion engine and serves less well consumers looking to buy a battery electric or fuel cell electric car."* (European Commission 2025).

This paper addresses this shortcoming, exploring options for a revised EU car label taking into consideration energy consumption of electric vehicles and concludes by presenting a preferred option and making recommendations for additional label design elements.

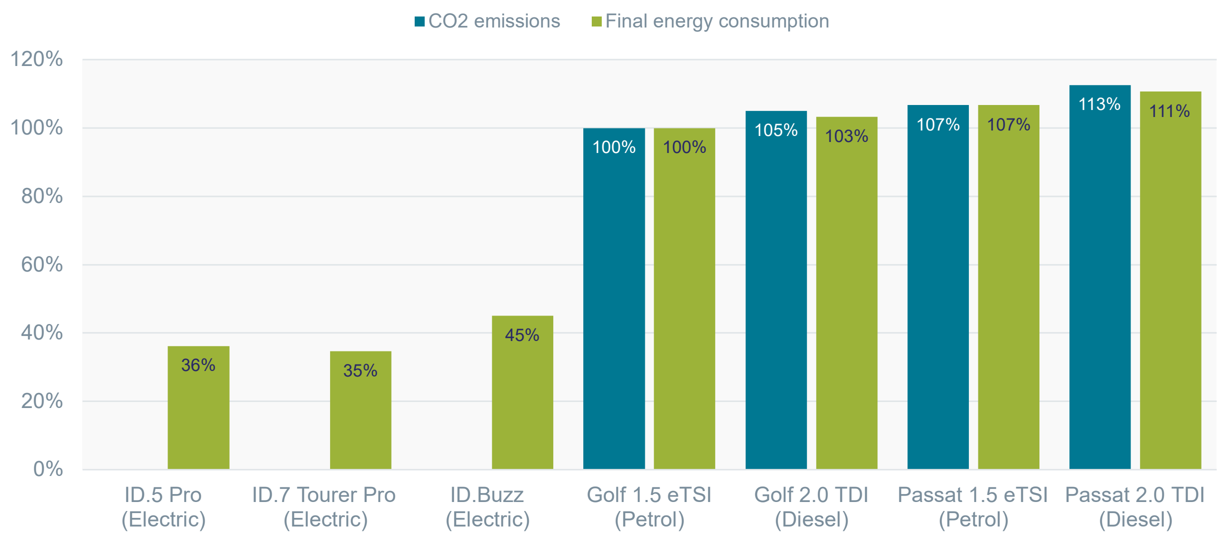
2 Base metric for a revised car label

The EU energy label rates products based on their energy efficiency whereas the current Car Labelling Directive requires Member States to provide information on distance specific fuel consumption and tailpipe CO_2 emissions, also referred to as tank-to-wheel CO_2 emissions. However, this approach does not allow for the differentiation in energy consumption levels and the environmental performance of zero emission vehicles as these vehicles have zero tailpipe CO_2 emissions and fuel consumption regardless of their level of energy consumption.

The following discusses possible base metrics for a car label and evaluates them against a set of relevant criteria.

Final energy consumption: An alternative approach that better takes electric vehicles into account, would be to use the final energy consumption rather than the tailpipe CO_2 emissions as a basis for rating the vehicles. The term final energy consumption covers the energy supplied to the vehicle in kWh to drive 100 km and follows the Worldwide harmonized Light vehicles Cycle (WLTC). For electric vehicles, this refers to the plug-to-wheel energy consumption based on the energy supplied from the grid to the vehicle. For combustion engine vehicles, this refers to the energy of the consumed fuel, that is tank-to-wheel, and for plug-in hybrid vehicles, the final energy consumption is the sum of grid energy and fuel energy. Since petrol and diesel have very similar CO_2 intensities per unit of energy, ratings of petrol and diesel vehicles would barely be impacted when shifting from tailpipe CO_2 emissions scale to an equivalent energy consumption scale, as shown in Figure 2-1 by the example of selected Volkswagen models. Therefore, a label based on the final energy consumption would convey the same message on petrol and diesel vehicles as one based on the tailpipe CO_2 emissions, at the same time, it would also give information about the energy consumption of battery electric and plug-in hybrid vehicles. It thereby allows consumers to directly differentiate both between vehicles having different powertrains and among vehicles of the same powertrain type. Advantageously, final energy consumption figures are readily available or can be derived from values determined during type-approval for all powertrain types.

Figure 2-1: Normalized tailpipe CO_2 emissions and equivalent final energy consumption for selected Volkswagen combustion engine and battery electric vehicle models. The VW Golf 1.5 eTSI OPF was arbitrarily selected as reference vehicle for the normalization.



Source: ICCT

Well-to-wheel CO_2 emissions: Another option would be to reflect the well-to-wheel CO_2 emissions or the primary energy consumption on the label. This includes the tank-to-wheel/plug-to-wheel emissions or energy consumption, as well as all CO_2 emissions or energy consumption associated with fuel and electricity production, transportation, and distribution. Well-to-wheel emissions could be derived from tank-to-wheel and plug-to-wheel figures using conversion factors. However, as for the lifecycle GHG emissions, this would result in non-harmonized label values and ratings for the same vehicle in different Member States due to the differences in CO_2 intensity of electricity production and distribution. Furthermore, as shown by Dena (Dena 2024), conversion factors are subject to significant temporal change for electricity due to the increasing share of renewable energies, which changes the primary energy demand over a vehicle's lifetime. The study also highlights that in Germany, more than half of BEV users have a private photovoltaic system, which means that much lower conversion factors should be applied for BEVs than derived from the grid energy CO_2 intensity.

Lifecycle greenhouse gas emissions: The most comprehensive indicator for differentiating the climate impact of vehicles of all powertrain type would be their lifecycle greenhouse gas (GHG) emissions. However, even though the European Commission is required to develop a common methodology for manufacturers for voluntary reporting of lifecycle GHG emissions from 2026 onwards, estimates of lifecycle GHG emissions are unlikely to be available for all vehicle models in the foreseeable future. Furthermore, besides the general uncertainty in the determination of lifecycle emissions, it would likely result in different ratings for the same vehicles in different countries due to, for example, differences in electricity CO_2 intensity. In addition, determining and verifying lifecycle GHG emissions is a data intensive and, consequently, costly procedure, but low cost is of importance considering the uncertainty of its effectiveness.

Table 2-1 rates the currently most widely used tank-to-wheel CO_2 emission label metric against the three potential alternative metrics discussed before based on seven criteria.

Table 2-1: Rating of potential label metrics

	Tank-to-wheel CO_2 emissions	Final energy consumption	Well-to-wheel CO_2 emissions	Lifecycle GHG emissions
Data availability	Very good – Type-approval values	Very good – Type-approval values	Good – Conversion factors available	Very poor – Only available for very few vehicles
Data reliability and accuracy	Good – Determined during type-approval, regular verification during conformity of production and in-service verification	Good – Can be derived from type-approval values; no in-service verification of electric vehicle energy consumption	Poor – Conversion factors vary by Member State and over time; do not account for private charging with solar energy	Very poor – Uncertain whether precise comparison between OEMs possible; verification very complicated
Enables consumers to align their purchase decisions with environmental values	Poor – No differentiation among BEVs possible; For ICEVs, only part of lifecycle GHG emissions are covered	Fair – Differentiation possible among vehicles of same powertrain type and between vehicles of different powertrain types; Covers only part of lifecycle GHG emissions/energy consumption	Good – Differentiation possible among vehicles of same powertrain type and between vehicles of different powertrain types; Does not cover vehicle production and scrappage related GHG emissions	Very good – Differentiation possible among vehicles of same powertrain types and between vehicles of different powertrain types; Covers all GHG emissions associated with vehicle production, usage and scrapping
Enables consumers to make purchase decisions based on vehicle usage costs	Very poor – No differentiation among BEVs possible; For ICEVs, unlikely that majority of consumers can link CO_2 emissions to fuel costs, also because costs depends on fuel type	Fair – Possible within the same powertrain and fuel type; Not possible across powertrain types as cost directly derivable for BEVs but unlikely that consumers can translate energy consumption to fuel costs for ICEVs; Costs depends on fuel types	Poor – Upstream emissions and energy consumption not directly linked to fuel or energy cost	Very poor – Upstream fuel/ electricity production, vehicle production and scrappage GHG emissions not linked to energy costs
Label harmonization and consistency of vehicle rating over time and across the EU Member States	Very good – The same vehicle will get the same rating in every Member State and over time	Very good – The same vehicle will get the same rating in every Member State and over time	Poor – Local and temporal variations in fuel/ electricity production CO_2 emissions affect vehicle rating; Different rating for same vehicles across Member States and over time.	Very poor – Local and temporal variations in upstream CO_2 emissions and vehicle scrappage emissions affect rating; Different rating for same vehicles across Member States and over time.
Cost associated with energy label	Very good – Minimum effort as same label layout and content can be used across Member States; Vehicle rating based on type-approval values.	Very good – Minimum effort as same label layout and content can be used across Member States; Vehicle rating based on type-approval values.	Poor – Same label layout and content can be used across Member States, but rating could differ as it depends on national fuel and electricity production CO_2 emissions	Very poor – High effort to determine lifecycle emissions for each vehicle; Vehicle rating could differ across Member States as it depends on national fuel and electricity production CO_2 emissions
Metric is flexible for future developments	Very poor – Most new vehicles will have zero tank-to-wheel emissions.	Very good – Metric independent of powertrain type and energy carrier.	Very good – Metric independent of powertrain type and energy carrier.	Very good – Metric independent of powertrain type and energy carrier.

Source: Own rating

In terms of the criteria rated in Table 2-1, final energy consumption is the metric with the overall best performance and is therefore chosen for the further analysis of label design options. This is in line with Dena's recommendation to use final energy consumption as a label metric (Dena 2024). Well-to-wheel CO_2 emissions and lifecycle CO_2 approaches are disregarded due to their limited practicality. The tank-to-wheel CO_2 emissions metric is considered in our analysis as an optional complementary indicator, as it is required to be reported under the current Car Labelling Directive.

3 Label design options

This chapter discusses various labelling options intended to enable consumers to make informed purchasing decisions when buying passenger cars. Section 3.1 therefore outlines the overarching design principles. Section 3.2 presents potential label designs, which differ primarily in terms of the base metrics described in Chapter 2. Section 3.3 presents conceptual drafts of these options and discusses their respective advantages and disadvantages. Finally, Section 3.4 uses this analysis to identify the most suitable label option.

3.1 Proposed general label design principles

This section describes four general design principles that are taken into account for all label options presented in the following sections.

1. **Visual design based on EU energy label:** Overall, it is suggested that a harmonised EU car label follow the overall visual design of the EU energy label which is well recognised by consumers[2]. This approach was also taken in the case of the Tyre-Labelling-Regulation. Currently, 13 out of 27 Member States have already adopted a graphical, class-based colour scheme to improve consumer understanding, and 10 Member States use a design similar to the EU energy label for other products (REGULATION (EU) 2017/1369, Dena 2024). The evaluation of the Car Labelling Directive states that labels based on colour-coded categories similar to the EU Energy Label are generally perceived as more understandable, recognisable and effective than labels that do not use colour coding (European Commission 2025). Lengthy explanatory texts, as required by some national implementations of the current Car Labelling Directive, should be avoided.

2. **Absolute rating – no adjustments for "utility**". Most Member States that have already implemented a label with colour code categories opted for a representation based on absolute emission or consumption values. This means that vehicles are grouped in efficiency classes solely based on their fuel consumption or CO_2 emissions, regardless of vehicle segment, mass or any other vehicle parameter. This approach to labelling has been shown to be clearer, more easily understood, and intuitive for consumers and should thus be more effective in informing consumer choice. (European Commission 2025, Ricardo 2019, Dena 2017). Consumers tend to trade off higher use value against higher energy consumption and would, for example, expect a small city car to perform better on energy consumption than a large family van.

   Germany, the Netherlands, and Spain originally used relative values, while Germany changed to absolute CO_2-emissions in the new label design (Pkw-EnVkV 2024). The idea behind relative values is to ease the comparison of models within the same segment by relating the absolute CO_2-emissions to the vehicle size (NL, ES) or mass (formerly DE). This way, a small vehicle featuring low CO_2-emissions may be assigned to the same efficiency class as a larger vehicle emitting higher CO_2-values. The reasoning is that consumers tend to choose the segment before they compare performance values of individual vehicle models (Dena 2017). However, it was shown that consumers did not understand the relative measure and confused the numbers with absolute figures (Dena 2017).

[2] In a survey conducted in 2019, 93 % of respondents who were EU citizens said they recognised the label, and 75 % of respondents said that the EU energy label had influenced their choice when purchasing an appliance in the last five years. https://energy-efficient-products.ec.europa.eu/ecodesign-and-energy-label/understanding-energy-label_en

Absolute values are more suited to meet the overall objectives of transparency for the consumer and incentives to reduce the energy consumption of new vehicles.

3. **For plug-in hybrids, provide two separate energy consumption or CO_2 ratings**: one for “electric driving”, using grid electricity (“charge depleting”)[3], and another for driving with an empty battery and, thereby, using the combustion engine and consuming fuel (“charge sustaining”). The “weighted combined” energy consumption and CO_2 emission figures based on an estimate of the share of charge depleting operation (so-called utility factor) are used for assessing manufacturer compliance with its CO_2 targets but are of little relevance to consumers. Moreover, the utility factor will undergo several adjustments over the coming years, resulting in changes to “weighted combined” energy consumption and CO_2 emissions of the same vehicle. Therefore, “weighted combined” energy consumption should not be used for rating the energy consumption.
4. Label shows **essential vehicle information**, in addition to the efficiency class on the colour scale. This includes fuel consumption and CO_2 emissions. For BEVs and PHEVs it also includes electric energy consumption and range.

3.2 Overview of potential design options

The following Table 3-1 structures potential approaches toward rating electric energy consumption as part of a harmonized car label. It distinguishes between label design options that use only the final energy consumption as the base metric and options that use both the final energy consumption and the CO_2 emissions as base metrics for each individual classification. Furthermore, it distinguishes between label design options that use a uniform rating for all powertrains and those that also provide a powertrain-specific rating.

Ratings that are purely powertrain-specific can be excluded from further analysis because they do not allow for comparisons across powertrain types. This would violate the aforementioned common design features and confuse consumers attempting to compare vehicles with different powertrains.

The following five options are retained for further analysis:

1. Uniform energy label
2. Uniform & specific energy label
3. Uniform CO_2- & energy-label
4. Uniform CO_2- and specific energy-label
5. Uniform CO_2 & specific energy label only for ZEV.

[3] In charge-depleting mode, the vehicle operates mostly on electricity. However, also the combustion engine can operate during charge depleting mode to assist the electric motor, for example at low battery charge levels or at high propulsion power demand.

Table 3-1: Overview of potential label design options, using different base metrics.

	Single base metric (energy consumption)	Dual base metric (CO_2 emission and energy consumption)
Uniform rating across all powertrains	"**Uniform energy label**": Simple uniform rating based on energy consumption across all powertrain types.	"**Uniform CO_2 & energy label**": Uniform CO_2 rating and energy consumption rating for all vehicles and all powertrains.
Uniform rating AND powertrain specific rating	"**Uniform & specific energy label**": Uniform energy consumption rating across all powertrain types AND powertrain specific rating.	**"Uniform CO_2- & specific energy label":** Uniform CO_2 rating across all powertrains, combined with powertrain specific energy consumption classes. Or simplified version: **"Uniform CO_2 & specific energy label only for ZEV":** Uniform CO_2 rating across all powertrains combined with energy consumption rating for zero-emission capable vehicles.

Source: Own compilation

3.3 Consideration of options

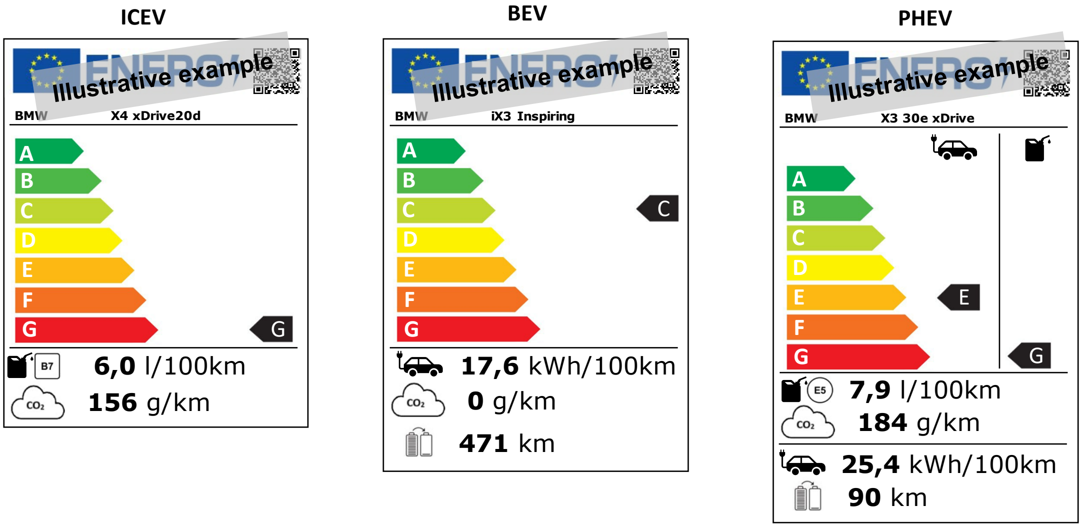
In this section, the five label design options presented in section 3.2 are visualized and their advantages and disadvantages discussed. For each of the design options, a draft label based on the EU Energy Label for three comparable sample medium sized SUVs with ICEV, BEV and PHEV powertrain options is shown. The draft labels are for illustrative and research purposes only. They are not official EU designs and do not represent any legally binding format.

Option 1: Uniform energy label

Option 1 provides a rating based on final energy consumption, displayed on a colour-coded scale with a uniform class definition for all powertrain types. It also displays information on energy consumption and CO_2 emissions for PHEVs in charge-sustaining mode, as well as the electric range for PHEVs and BEVs. Figure 3-1 illustrates the design for sample vehicles with ICEV, BEV and PHEV powertrain options.

A BEV with an electricity consumption of 17.6 kWh/100 km, which was used as the sample vehicle in the illustrations, would receive a fair rating. In contrast, an ICEV with a fuel consumption of 6 litres of diesel per 100 km, equivalent to around 58 kWh/100 km, which is more than three times that of the BEV, would receive a poor rating. The selected PHEV has a fuel consumption of 7.9 litres of petrol per 100 km in charge-sustaining mode, which corresponds to nearly 70 kWh/100 km. This results in a poor rating, whereas the rating for electric energy consumption in charge-depleting mode (25.4 kWh/100 km) would be better.

Figure 3-1: Conceptual drafts of the uniform energy consumption label for comparable ICEV, BEV and PHEV models



Source: own illustration based on other EU energy labels.

The advantages and disadvantages of a uniform energy consumption label are shown in Table 3-2.

Table 3-2: Advantages and disadvantages of a uniform energy consumption label

Pros	Cons
• Allows direct comparison of tank/battery-to-wheel energy consumption between vehicles of different powertrain types. • Allows linking subsidies or tax incentives independent of the powertrain type but related to energy consumption classes. • Would allow comparison of the total plug-in hybrid energy efficiency (fuel plus electricity) in different operating modes (charge sustaining mode, charge depleting mode). • Can be extended to any new powertrain type entering the market. • Fulfills the goal of lowering CO_2 emissions indirectly since vehicles with a lower energy consumption also have lower CO_2 emissions.	• Dropping CO_2 emission rating: the ultimate goal of the Car Labelling Directive and other relevant EU legislation is reducing CO_2 emissions. • Limited differentiation between vehicles of same powertrain type, as the rating scale would cover a wide range of energy consumption levels.

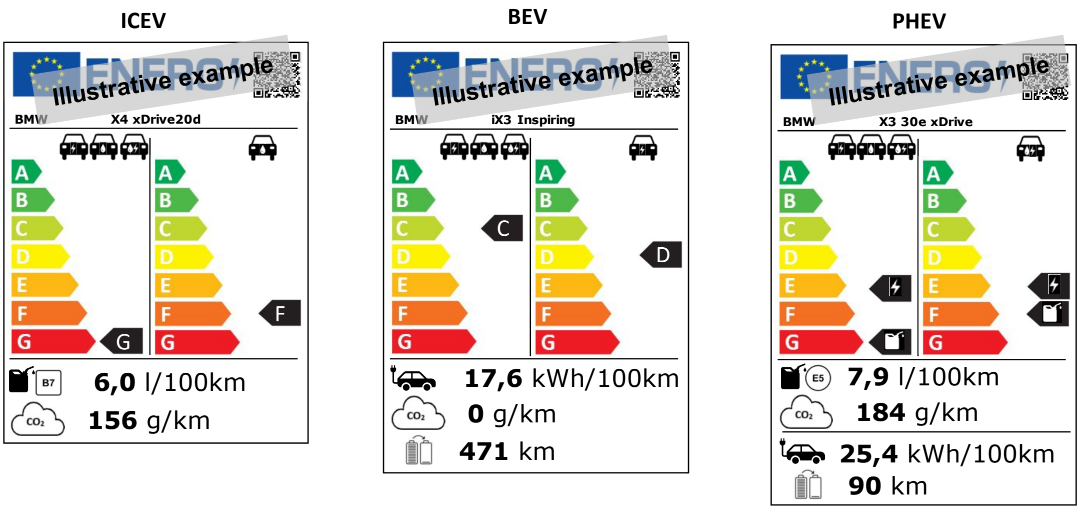
Source: Own compilation

Option 2: Uniform & specific energy label

This option adds a powertrain-specific rating to the uniform rating described in Option 1. It was suggested by Dena (2024) as part of a proposal for a revised German car label. Figure 3-2 illustrates the conceptual draft for a combined uniform and powertrain-specific energy consumption label. The elements of the label shown correspond to those of the combined uniform label described above. However, the classification into energy consumption classes on a colour-coded scale is performed twice: on the left for all passenger cars, and on the right for vehicles of the same powertrain type.

Compared to the uniform rating, the powertrain-specific rating is slightly better for the ICEV and the PHEV in charge-sustaining mode and slightly worse for the BEV for the chosen sample vehicles.

Figure 3-2: Conceptual drafts of the combined uniform and powertrain specific energy consumption label for comparable ICEV, BEV and PHEV models



Source: own illustration based on other EU energy labels.

The advantages and disadvantages of a combined uniform and powertrain-specific energy consumption label are summarised in the following Table 3-3.

Table 3-3: Advantages and disadvantages of a combined uniform and powertrain-specific energy consumption label

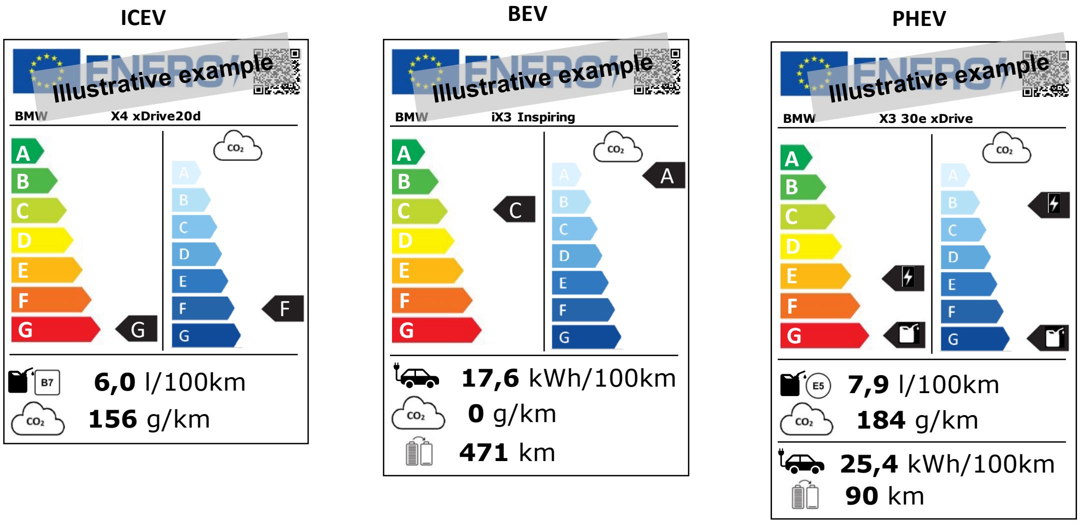
Pros	Cons
• Allows direct comparison of tank/battery-to-wheel energy consumption between vehicles of different powertrain types. • Added insight of energy performance relative to other vehicles of same powertrain type. • More granular rating of powertrain-specific energy consumption is possible. • Would allow comparison of the total plug-in hybrid energy efficiency (fuel plus electricity) in different operating modes (charge sustaining mode, charge depleting mode). • Can be extended to any new powertrain type entering the market.	• Two separate ratings of energy consumption carry potential for confusing consumers when comparing vehicles of different powertrain type. • Without additional explanation, consumers may find it unclear which rating carries more weight, creating a risk that they prioritise the wrong one in their decision-making. • For plug-in hybrids, four different ratings would be required to cover energy consumption in charge sustaining and charge depleting mode both in the uniform and powertrain specific rating. • Dropping CO_2 emission rating: the ultimate goal of the Car Labelling Directive and other relevant EU legislation is reducing CO_2 emissions.

Source: Own compilation

Option 3: Uniform CO_2- & energy-label

This option is based on the uniform energy label described in Option 1, but it also includes a CO_2 rating on a second colour-coded scale. The CO_2 rating shown for the sample vehicles in Figure 3-3 depends on the definition of the CO_2 classes, but since BEVs have zero tailpipe CO_2 emissions, they would always receive the best rating. PHEVs typically consume some fuel in charge-depleting mode, so they would obtain a slightly lower rating than BEVs. In charge-sustaining mode, their emissions can be directly compared with those of ICEVs.

Figure 3-3: Conceptual drafts of the combined uniform energy consumption and unform CO_2 emissions label for comparable ICEV, BEV and PHEV models



Source: own illustration based on other EU energy labels.

Table 3-4 shows the advantages and disadvantages of a combined uniform energy consumption and unform CO_2 emissions label.

Table 3-4: Advantages and disadvantages of a combined uniform energy consumption and unform CO_2 emissions label

Pros	Cons
• Energy consumption rating allows choosing the most efficient powertrain type. For a given powertrain, CO_2 rating allows consumers to choose the model with lower CO_2 emissions. • CO_2 rating would be aligned with the label design currently used in some Member States. In those countries, consumers and salespersons would be accustomed to the CO_2-emissions based classification. • Would allow comparison of the total plug-in hybrid energy efficiency (fuel plus electricity) in different operating modes (charge sustaining mode, charge depleting mode). • The CO_2 rating for a BEV would always result in the best class. Therefore, the label option is in line with the EU's objective of increasing the uptake of zero-emission vehicles.	• Focus on tailpipe CO_2 will become less relevant with the market transition to electric vehicles. • Two separate metrics on two closely positively correlated indicators (energy consumption and CO_2-emissions) make comparisons between vehicles more confusing. • Without additional explanation, consumers may find it unclear which rating carries more weight, creating a risk of confusion in their decision-making. • For plug-in hybrids, four different ratings would be required to cover CO_2 emissions and energy consumption in charge sustaining and charge depleting mode both in the CO_2 and the energy consumption rating.

Source: Own compilation

Option 4: Uniform CO_2- and specific energy-label

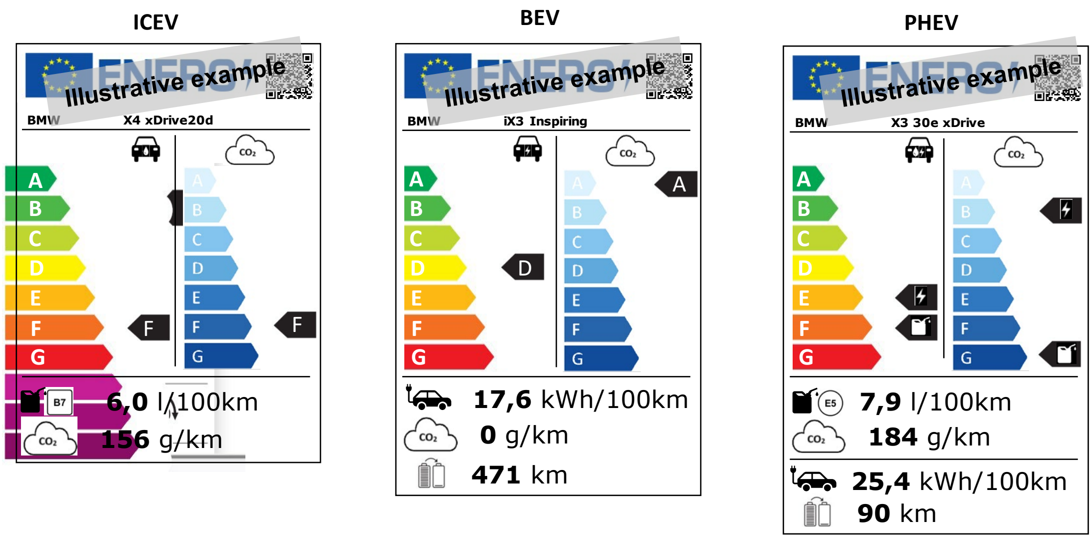
This option provides a uniform CO_2 rating for all powertrain types alongside an energy consumption rating on a second colour-coded scale. The latter uses powertrain-specific classes to enable more detailed differentiation within each powertrain type.

However, when comparing the end-energy ratings of the ICEV and BEV samples in Figure 3-4, the substantial difference in their energy consumption is hidden. Although the ICEV consumes more than three times as much energy, it is rated F, only slightly worse than the BEV's rating of D, meaning consumers cannot use this metric to compare vehicles across powertrains.

By contrast, the CO_2 rating does enable cross-powertrain comparisons; however, since BEVs always fall into the best category, no differentiation amongst them is possible.

All other design elements are consistent with the previous options.

Figure 3-4: Conceptual drafts of the combined uniform CO_2 emission and specific energy consumption label for comparable ICEV, BEV and PHEV models



Source: own illustration based on other EU energy labels.

Table 3-5 below shows the advantages and disadvantages of Label Option 4. A key concern is that consumers may mistakenly compare the energy consumption ratings of vehicles with different powertrain types. Option 5, described below, addresses this issue by building on Option 4 but simplifying it, and displaying the electric energy consumption rating only for ZEV capable powertrains in zero-emission operation.

Table 3-5: Advantages and disadvantages of a combined uniform CO_2 emission and specific energy consumption label

Pros	Cons
• Allows direct comparison of tank/battery-to-wheel energy consumption between vehicles of the same powertrain types. • CO_2 label would be aligned with the label design currently used in some Member States. In those countries, consumers and salespersons would be accustomed to the CO_2-emissions based classification. • The CO_2 rating for a BEV would always result in the best class. Therefore, the label option is in line with the EU's objective of increasing the uptake of zero-emission vehicles.	• Focus on tailpipe CO_2 will become less relevant with the market transition to electric vehicles. • Two separate ratings on two closely positively correlated indicators (energy consumption and CO_2-emisisons) make comparisons between vehicles more confusing. • Without additional explanation, consumers may find it unclear which rating carries more weight, and they may not realize that the specific energy consumption weighting doesn't allow cross-powertrain comparisons. • Risk of unintended messaging when efficient combustion cars perform better on powertrain-specific rating than average electric cars, despite overall lower energy consumption and better environmental performance of the latter. • For PHEVs, the label becomes exceedingly complicated as both energy consumption and CO_2 emissions would need to be rated in both EV and charge sustaining modes.

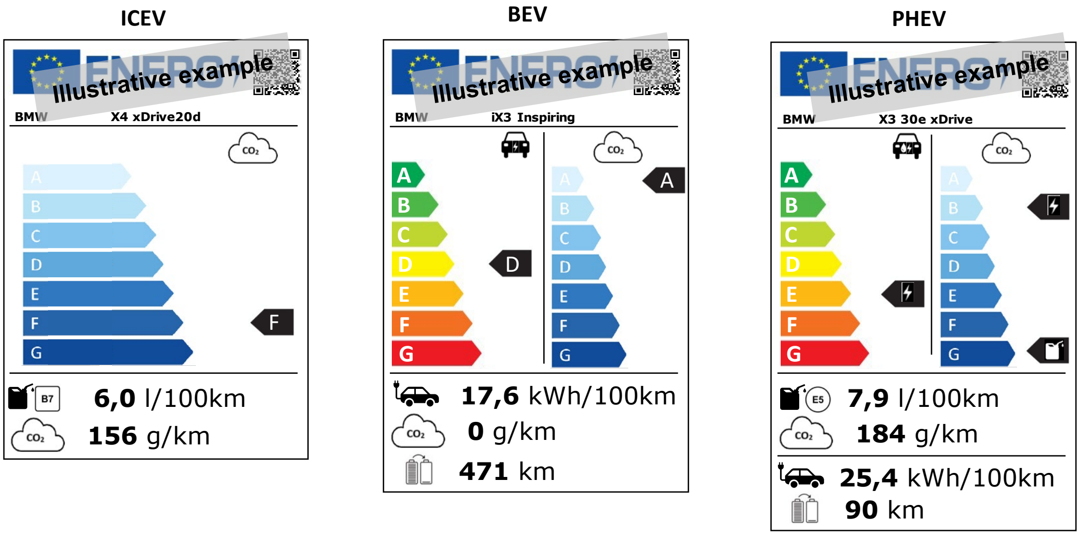
Source: Own compilation

Option 5: Uniform CO_2 & specific energy label only for ZEV

This option is a simplified version of Option 4, providing a uniform CO_2 rating for all powertrain types, as well as a specific energy consumption rating for vehicles with zero emission capable powertrains on a second colour-coded scale. The aim is to reduce the complexity and the risk of inappropriate cross-powertrain comparisons by removing the energy consumption rating for ICEVs.

For PHEVs, the energy consumption rating is given for charge-depleting mode. For the selected example models, the CO_2 rating of the PHEV in charge sustaining mode is slightly worse than that of the ICEV and slightly worse than the BEV in charge depleting mode. While the specific energy consumption rating allows for a more detailed differentiation between different BEV or PHEV models, it still does not allow for cross-powertrain comparisons.

Figure 3-5: Conceptual drafts of the combined uniform CO_2 emission and specific energy consumption label for ZEV capable powertrains for comparable ICEV, BEV and PHEV models



Source: own illustration based on other EU energy labels.

The advantages and disadvantages of a uniform CO_2 emission and specific energy consumption label for ZEV are summarised in the following Table 3-6.

Table 3-6: Advantages and disadvantages of a combined uniform CO_2 emission and specific energy consumption label for ZEV capable powertrains

Pros	Cons
• CO_2 label would be aligned with the label design currently used in some Member States. In those countries, consumers and salespersons would be accustomed to the CO_2-emissions based classification. • The CO_2 rating for a BEV would always result in the best class. Therefore, the label option is in line with the EU's objective of increasing the uptake of zero-emission vehicles. • An additional rating for specific energy consumption is only applied to zero emission capable vehicles (ZEVs and PHEVs). This allows for better differentiation in energy performance between electric vehicles.	• Focus on tailpipe CO_2 will become less relevant with the market transition to electric vehicles. • Two metrics for zero emission capable vehicles makes the label more confusing, esp. for PHEVs. • Without additional explanation, consumers may find it unclear which rating carries more weight, and they may not realize that the specific energy consumption weighting doesn't allow cross-powertrain comparisons.

Source: Own compilation

3.4 Comparison of label design options

This section evaluates the suitability of the five label design options presented above, considering consumer comprehensibility, the ability to support informed vehicle choices, and alignment with EU climate and energy policy objectives and raise consumer awareness for BEV efficiency and, thereby, potentially increase the demand for vehicles with lower energy consumption.

Options 2, 3 and 4 cannot be recommended. All three introduce multiple parallel ratings, either by combining uniform and powertrain-specific classifications, or by presenting both CO_2 and energy consumption metrics. Such approaches risk creating significant consumer confusion and rely partly on indicators that, although strongly correlated, are displayed separately. Without an extensive explanation, consumers may misinterpret which rating is most relevant and prioritise the wrong one when making purchase decisions. Furthermore, these options become excessively complex for plug-in hybrids, as they require several ratings for different operating modes, thereby undermining transparency and usability.

Option 5 was designed to address some of the shortcomings of Option 4, limiting the energy consumption rating to vehicles capable of zero emissions. While this reduces the risk of misinterpretation when comparing ZEVs and ICEVs, it does not eliminate it when comparing models with different ZEV-capable powertrains. It retains the dual-metric approach (CO_2 plus energy consumption) for BEVs and PHEVs, which risks causing further consumer confusion. It also excludes ICEVs from the energy rating altogether, thereby preventing direct comparison across all vehicle types. This undermines one of the central objectives of the label: enabling consumers to easily compare efficiency across the entire vehicle market. Regarding the energy consumption of electric vehicles, however, this option has the advantage that a more granular differentiation between these vehicles is possible.

By contrast, Option 1 offers a simple, coherent and consumer-friendly approach. Its single, uniform rating, based on final energy consumption, allows for straightforward comparisons across all powertrain types. It avoids unnecessary complexity and remains adaptable to future technologies. Although it provides limited differentiation among BEVs, it is the clearest, most intuitive option. Furthermore, consumers can still compare CO_2 performance across different models and powertrain types by directly comparing vehicle CO_2 emissions in g/km, as provided on the label.

Based on this analysis, Options 1 and 5 could be viable. Overall, however, we view Option 1 as the preferred design. It is the only option that combines transparency, cross-powertrain comparability, and ease of understanding for consumers, while aligning with the overarching objective to support a shift towards more energy-efficient and low-emission vehicles. We therefore develop a specific design proposal based on Option 1 in the following section.

4 Proposal for label energy class definition

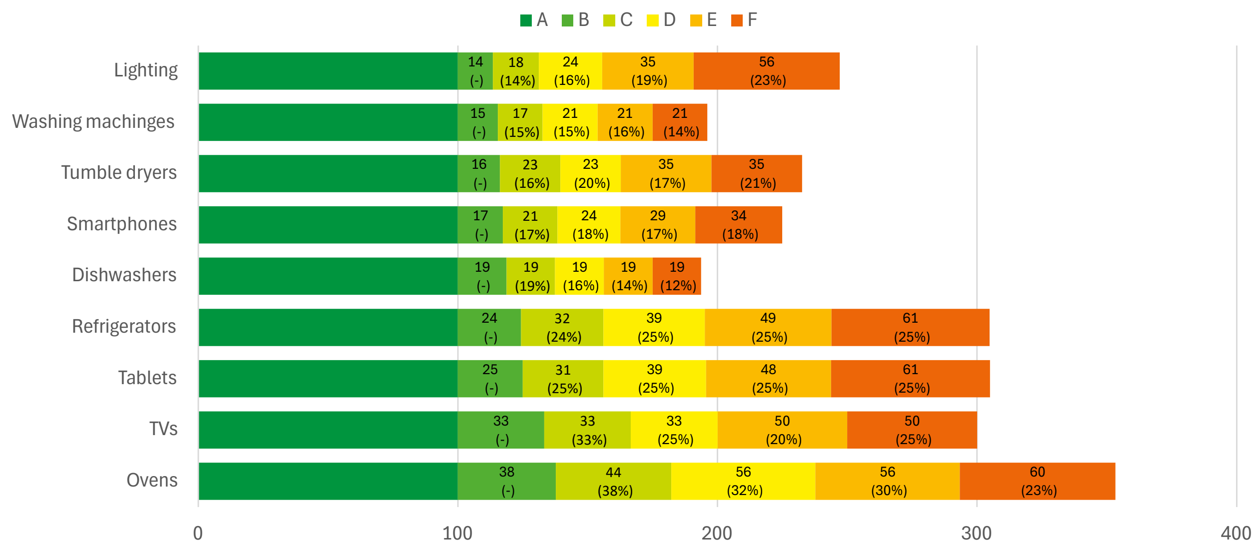
4.1 Principles and class scales used in EU energy label

When developing class boundaries, we first analysed the general requirements applying for the EU energy label:

- No products should be expected to fall into the best energy class when the label is introduced or revised.
- To avoid that frequent revisions of the label classes are required, it should at least take 10 years until the majority of products fall into the best class.
- If 30 % of products fall into the best class, or 50 % fall into the best and second-best classes, and further improvement can be expected, the classes should be rescaled.

The EU energy label uses seven classes A-G, with class A containing the products with the lowest energy consumption and class G is applied to all products having lower efficiency than covered by class F. Figure 4-1 reflects the size of the energy classes relative to the width of class A, and class A being normalized to range from 0 to 100. It shows that no harmonized rules apply for the size of the classes or the change in size from class to class. For some products, like dishwashers, the class size remains constant in absolute terms from class B to class F. For other products, like tablets, refrigerators and washing machines, the class size remains almost constant in percentage terms, relative to the lower bound of the class. In some instances, class size changes do not follow a constant pattern, possibly instead following a distribution of products on the market, for example for labelling tumble dryers and TVs. For all labels analysed, the energy consumption of products in class F is 2-3,5 times higher than for those in class A. Products with an energy consumption higher than that of class F fall into class G, which has no upper limit and is therefore not shown in Figure 4-1.

Figure 4-1: Normalised EU energy class distributions of selected consumer products. Class A is normalized to range from 0 to 100. The size of other classes is shown relative to the width of class A.



The label values inside the bars show the absolute class width while the percentage values indicate the class width relative to its lower bound. Class G (not shown) covers products with an energy rating above class F and has no upper limit.

Source: Own illustration.

4.2 Proposal for class scale for “Option 1”-label

Based on the energy consumption distribution of the fleet of newly registered vehicles in the years 2022 to 2024, we developed a proposed energy consumption class distribution, as listed in Table 4-1 and graphically presented in Figure 4-2. The methodology used for determining the equivalent energy consumption of combustion engine vehicles and plug-in hybrid vehicles is described in section 1 (Annex).

Table 4-1: Proposed energy consumption classes and share of passenger cars covered contained in each class, by powertrain type and, in case of plug-in hybrid vehicles (PHEVs), by operating mode. Based on vehicles registered in the EU from 2022 to 2024.

Class	Class limits – Energy consumption (EC) (kWh/100 km)	Class width (kWh/100 km)	BEV	ICEV	PHEV CD	PHEV CS
A	EC ≤ 12.4	12.4	0%	0%	0%	0%
B	12.4 < EC ≤ 15.5	3.1 (25% of class A)	28%	0%	0%	0%
C	15.5 < EC ≤ 19.2	3.7 (Class B + 20%)	64%	0%	10%	0%
D	19.2 < EC ≤ 23.7	4.5 (Class C + 20%)	7%	0%	38%	0%
E	23.7 < EC ≤ 29.0	5.3 (Class D + 20%)	1%	0%	32%	0%
F	29.0 < EC ≤ 36.0	7.0 (Class E + 30%)	0%	2%	14%	0%
G	36.0 < EC ≤ 45.1	9.1 (Class F + 30%)	0%	24%	5%	2%
H	45.1 < EC	NA	0%	75%	0%	98%

Source: ICCT. Shares per powertrain type may not add up to 100 % due to rounding.

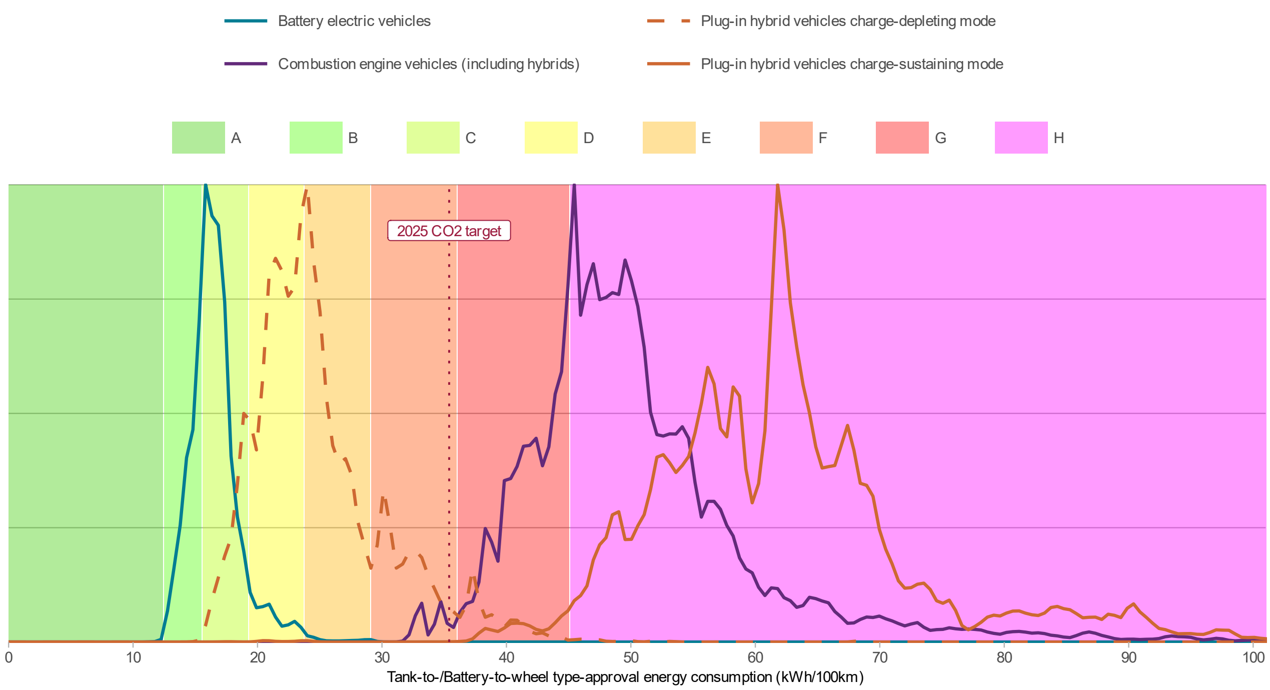
Class A, the best class, would contain vehicles with an energy consumption of up to 12.4 kWh/100 km. As of today, no vehicle would get a class A rating. The second-best class, class B, has a width of 3.1 kWh/100 km, which is 25 % of the width of class A. Classes C, D and E each cover a 20 % wider energy consumption range than the previous classes. Classes F and G mostly cover combustion engine vehicles. Due to the low powertrain efficiency of ICEVs compared to BEVs, the same reduction in cycle energy demand, achieved for example through better aerodynamics or lightweighting, results in higher end energy consumption reductions for ICEVs than for BEVs. Therefore, larger class sizes were chosen for class F and G, each 30 % larger compared to the previous class. Due to the wide range of energy consumption values covered by today’s vehicles, we suggest adding an eight class H, that would contain all vehicles with an energy consumption of more than 45.1 kWh/100 km.

Applying this distribution of energy consumption classes on the vehicles registered in the years 2022 to 2024, BEVs would mostly be grouped in classes B to D, as shown in Table 4-1 and Figure 4-2.

About 28 % of the BEVs would be in class B, 64 % would have a class C rating and 7 % would be in class D. PHEVs have a higher energy consumption in CD mode than BEVs and their rating, therefore, would stretch across 5 classes from C to G. About 10 % of the PHEVs in CD mode would get a class C rating and about one third each would be grouped in classes D and E. 14 % and 5 % of PHEVs in CD mode would get class F and G rating, respectively. ICEVs, including hybrids, can almost exclusively be found in classes G and H, with an approximate 25:75 split. Due to the higher energy consumption of PHEVs in CS mode compared to other ICEVs, almost all PHEVs would be in class H.

This definition of energy consumption classes would allow consumers to consider the energy consumption in their purchase decision both across powertrain types and within the same powertrain type, as vehicle models of the same powertrain type can be found in at least three classes, except for PHEVs in CS mode. Furthermore, the suggested class definitions provide an incentive for manufacturers to offer and promote vehicles with lower energy consumption as the next better energy consumption class is within reach for all powertrain types. The most efficient BEVs would require a 1 % reduction of energy consumption to reach class A. A small number of ICEVs registered are already in class F, the class that also incorporates the energy consumption equivalent to the 2025-2029 CO_2 fleet target. Regarding PHEVs in CD mode, no vehicle would currently get a class B rating. For PHEVs in CS mode, the same class coverage as for ICEVs should be achievable considering they can operate as conventional hybrid vehicles in this mode.

Figure 4-2: Proposal for energy consumption classes for a uniform energy consumption label for passenger cars in the EU compared to the energy consumption of passenger cars registered in the EU from 2022 to 2024.

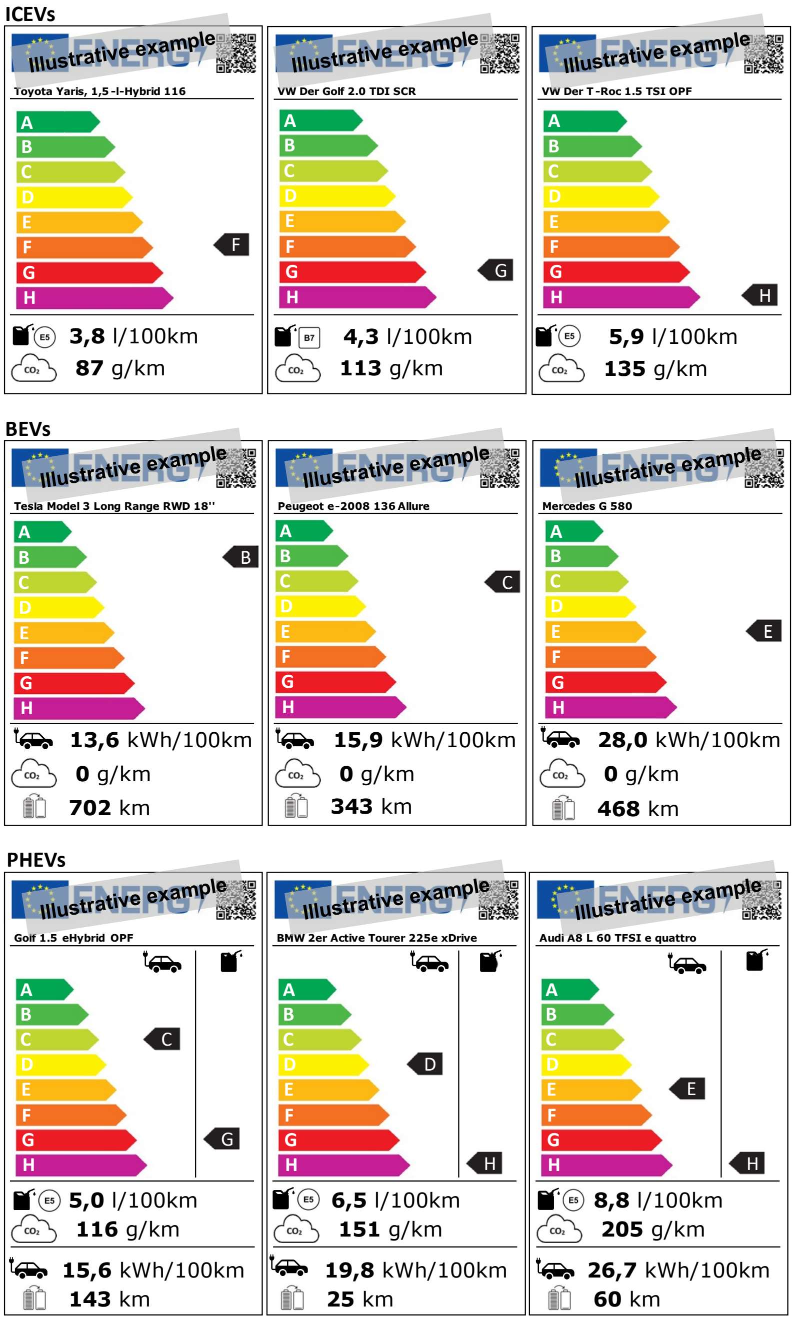


Source: ICCT

4.3 Draft uniform energy consumption label using the developed efficiency classes

Figure 4-3 shows a draft of the proposed uniform energy consumption label, taking into account the class boundaries developed above. In the first row, labels for three example ICEVs are shown. Row two shows the labels for three BEVs and the last row for PHEVs. The label allows for a differentiation of vehicles of the same powertrain type and of different powertrain types and thereby enables customers to assess energy efficiency at a glance, with the exception of PHEVs. In the case of PHEVs, the different energy consumption classification for the two operating modes allows for a direct comparison to BEV and ICEV energy consumption for each mode.

Figure 4-3: Conceptual drafts of the uniform energy consumption label for a different ICEV, BEV and PHEV



Source: own illustration based on other EU energy labels.

5 Potential further information to be provided by the car label

In addition to energy consumption, the car label can also be used to provide vehicle purchasers with information related to the environmental performance or costs of the vehicle. This section presents potential parameters that could be communicated through the label.

When it comes to label content, there is a conflict between making information easily understandable and providing more details, which increases label complexity.

More details can help consumers to make a better-informed purchase decision. However, it increases complexity and, thereby, poses the risk of discouraging consumers from reading the label. The new energy label for smartphones and tablets shows a good balance of readability while still providing additional information by using easy-to-understand symbols. Furthermore, information that might overload the label or vary between EU Member States, such as fuel and energy costs or links to online calculators[4] for usage-dependent costs or emissions, could be provided via a QR code or a link on the label directing to a product information sheet. This would allow the label to remain clean and only display the most relevant information.

Providing detailed **energy consumption data for different driving situations** (urban, suburban, rural and motorway), based on the information contained in section 49 of Part 2 of the EU Certificate of Conformity, allows consumers to better understand the influence of vehicle usage on energy consumption. This information becomes particularly useful when paired with an online calculator that allows consumers to estimate their vehicle usage and, in the case of electric vehicles, calculate expected energy consumption, costs, and range. The information could be made accessible via a product information sheet.

The usability of BEV and PHEV vehicles is affected by the electric range, battery durability warranties, and **charging time** or **charging speed** e.g. as the time to recharge electric energy to cover 100 km, and it would therefore recommend displaying this information on the label. However, currently there is no standardised test procedure for determining charging speed (DENA 2024).

Especially for BEVs and PHEVs in charge depleting mode, energy consumption and thereby electric range vary greatly depending on the outside temperature. However, type-approval energy consumption is currently only determined at 23°C and with deactivated auxiliaries, like air conditioning. It is foreseen that Euro 7 will introduce an additional test at -7°C with active heating to determine the **energy consumption and range in winter conditions**. We recommend displaying this information on the car label to better inform consumers about the effect of ambient temperatures on range and the energy consumption and to incentivize manufacturers to further optimize the energy demand of thermal control. Once broadly available, this information should also be taken into account in the energy label rating to improve real world representativeness of the rating. Furthermore, this information could also advantageously be integrated in the online calculator mentioned above.

As our analysis shows, using **well-to-wheel CO_2 emissions** as a metric for a harmonized car label is not recommended. However, this information could still be of interest to consumers and could be made available via an online tool accessible via a product information sheet. This tool could take into account the varying CO_2 intensity of electricity across the Member States.

Providing information on **vehicle air pollutant emissions** on the car label as in France, Belgium and Finland (DENA 2024), would give consumers further information on the environmental

[4] See the European Alternative Fuels Observatory online calculator as an example: https://alternative-fuels-observatory.ec.europa.eu/consumer-portal/calculator

performance of vehicles. Since tailpipe particle, nitrogen oxides, carbon monoxide, and hydrocarbon emissions will contribute less with increasing zero-emission vehicle sales shares, tire and brake particle emissions gain relevance and should also be made be made available via a product information sheet.

The manufacture of batteries for BEVs and PHEVs is associated with substantial GHG emissions. Knowledge about the **carbon footprint of the batteries**, which can be derived from the battery pass from February 2027 onwards, can help consumers choose more climate-friendly car models and, thereby, incentivize manufacturers to install batteries with a lower carbon footprint. This information could be provided via a product information sheet.

Consumers substantially underestimate the cost of owning and operating a vehicle (Canzler et al, 2025). While the car labels used in Denmark, Germany, Estonia and Finland provide information on energy costs and/or vehicle taxes, consumers mostly underestimate the value loss and the costs of repair and maintenance. Therefore, it would be most useful for consumers to display total cost of ownership estimates on the label or to include a link to a calculator, like for example the cost calculator of the German car club ADAC[5]. Since most costs elements vary across Member States, this information would preferably be made available via a product information sheet.

5 https://www.adac-autokosten.de/start.aspx

6 Summary and conclusions

The current EU Car Labelling Directive has led to a multitude of different labels across the Member States, differing in the information shown on the label, how the information is presented, and the classification of vehicles in efficiency classes. Furthermore, the current label focuses on fuel consumption or CO_2 emissions only and, therefore, does not account for the energy consumption of electric vehicles. Considering the increasing market share of electric vehicles, it is recommended to revise the labelling metric and to harmonise it across the EU. The European Commission's 2025 evaluation of the Car Labelling Directive also showed that a revised car label needs to incorporate ZEVs more effectively. Therefore, different labelling options were explored and a proposal for a revised EU car label was developed.

To effectively support informed consumer choices, the label design should be simple and easy to interpret. Since the EU Energy Label, displaying a colour coded rating for comparing the energy consumption of consumer products, is widely recognised and trusted by EU citizens, we recommend a similar design for the car label.

As a base metric for the rating displayed on the colour coded scale, tailpipe CO_2-emissions, final energy consumption, WTW CO_2-emissions and life cycle CO_2-emissions have been analysed. To make the revised label future proof and enable consumers to compare vehicles across powertrain types, we recommended a label using the final energy consumption for rating the vehicles and to perform the rating independent of the powertrain type. For electric vehicles, the final energy consumption equals the energy consumption determined during type approval. For combustion engine vehicles, the final energy consumption can be derived by converting the type-approval fuel consumption values using fuel type specific conversion factors. For plug-in hybrid vehicles, we recommend displaying the final energy consumption rating separately for driving with an empty battery, that is in charge sustaining mode, and when driving in charge depleting mode. This is because the actual energy consumption experienced by the driver depends on the distance share driven in these two modes and, thereby, is directly affected by the charging behaviour of the user. The official weighted, combined values assume a fixed distance share in these modes and do not provide usable information to the consumer.

Based on the findings, five design options have been visualised and discussed. Common to all designs is a colour coded rating based on either CO_2 emissions or energy consumption, using the same class boundaries for all powertrain types. For some of the analysed design options, this label is complemented with a second powertrain-specific colour coded rating to allow for a more granular distinction between vehicles of the same powertrain type. We identified the design option using a single scale based on energy consumption, applicable to all powertrain types, as the easiest to understand and least likely to be misinterpreted.

The proposed energy consumption classes are based on the energy consumption distribution of vehicles registered in the EU from 2022-2024 and applying design principles used for the EU Energy Label. Deviating from the EU Energy Label, we consider eight energy consumption classes, instead of seven, considering the wide range of energy consumption values for cars of different powertrain types. Vehicles of each powertrain type fall into at least three classes, enabling consumers to also differentiate between vehicles of the same powertrain type.

Other elements relevant for the environmental performance of the vehicle, like energy consumption of electric vehicles at low and high ambient temperatures, charging speed, or CO_2 emissions of PHEVs in charge sustaining mode, are preferably included on the revised car label.

Further information such as energy consumption data for different driving situations or air pollutant emissions can be made accessible via a product information sheet. A link to an online calculator could also be embedded here to provide information on energy costs or taxes that differ between Member States.

Annex

1. Methodology

Comparing the energy consumption of vehicles of different powertrain type requires using the same metric and unit for all energy consumption values; in this analysis, kWh/100 km is used. While the energy consumption for battery electric vehicles is already reported in this unit in the CO2 performance monitoring data published annually by the European Environment Agency (EEA), the equivalent energy consumption of combustion engine vehicles was derived from the CO_2 emission values, using a conversion factor of 0.3722 for diesel and 0.3786 for gasoline vehicles to convert from g CO_2/km to kWh/100 km.

Plug-in hybrid vehicles (PHEVs) can be operated in two modes; the charge-depleting (CD) mode, where the vehicle is largely powered by electricity, and charge-sustaining (CS) mode, where the vehicle operates mostly on fuel. As energy consumption in both modes differs substantially, the average PHEV energy consumption is strongly affected by the share of driving in CD and CS mode, which in turn depends on the battery charging behaviour of the user. Therefore, this analysis considers energy consumption in CD and CS mode separately instead of using the weighted, combined values which are based on an assumed share of driving in CD mode, which is irrelevant for the individual consumer.

The EEA monitoring data does not provide CO2 emission and energy consumption values separately for CD and CS modes. Therefore, the following calculations were performed:

1. **Charge sustaining energy consumption:** As explained in Appendix B of the ICCT white paper "Real-world usage of plug-in hybrids in Europe"[6], the CO_2 emissions in charge sustaining mode can be derived fairly accurately from the weighted, combined CO_2 emissions and a utility factor (UF_EAER) calculated based on the equivalent all electric range (EAER). EAER is also reported in the EEA dataset. UF_EAER was determined using the d_{nea} parameter defined in regulation (EU) 2023/443. The energy consumption was then calculated from the CO_2 emission values using the conversion factors from above, depending on the PHEV fuel type.
2. **Charge depleting energy consumption:** The energy consumption provided in the EEA dataset is the utility factor weighted electric energy consumption in CD mode. This value is based on the assumption that a PHEV drives only a certain share of the total distance in CD mode. This CD mode drive share is reflected in the utility factor. The unweighted CD electric energy consumption can be determined by dividing the weighted consumption in CD mode by the utility factor. For type-approval, the utility factor (UF_RCDC) is calculated from the range in charge depleting mode (RCDC). While RCDC is not contained in the EEA dataset, it can be derived from the EAER taking into account that RCDC is the same or higher than the EAER and RCDC is a multiple of the type-approval cycle distance of about 23 km.

During the type-approval test in CD mode, the vehicle is not driving purely on electric energy but also the combustion engine operates and, therefore, CD CO_2 emissions are not zero. Using the weighted, combined CO_2 emissions, the CS mode CO_2 emissions and the UF_RCDC, the CD CO_2 emissions were estimated. As for the CS CO_2 emissions, the CD CO_2 emissions are then converted to an equivalent energy consumption value, using the fuel type specific conversion factor. The sum of CD electric energy consumption and CD fuel energy consumption is then the final CD energy consumption value used for our analysis.

2. Considerations regarding content and scope of the label

Considerations about real-world vs official data shown on the label

The current car label is based on the official CO_2 emission and fuel consumption values determined during type-approval. However, multiple analyses have found that real-world fuel and energy consumption values are substantially higher than the type-approval values. (European Environment Agency; ICCT 2024)

Since the purpose of the label is to inform consumers for making informed purchase decisions, it would be appropriate to reflect values on the label that better indicate the consumption that can on average be expected under real-world conditions. This is of particular importance in view of the large differences in the real-world to type-approval gap between powertrain types and engine technologies.

For example, in the United States, the fuel economy label by the Environmental Protection Agency does not show the official type-approval value, used for determining compliance with the corporate average fuel economy standards, but a corrected, more real-world representative value. Upon manufacturers' choice, this real-world value is either determined by applying a constant factor on the official value or the manufacturer can perform three additional test cycles, at cold and hot ambient conditions and one test with aggressive driving. The results of all test cycles are weighted to determine the real-world representative value. The weighting factors are adjusted regularly to ensure that the values displayed on the label are in line with the consumption experienced by consumers.

A similar approach could be applied in the EU. A generic markup on type-approval energy consumption could be used (e.g. drawing on aggregated OBFCM data as provided by the European Environment Agency. Manufacturers that would prefer to apply vehicle model individual values, could voluntarily perform an additional -7°C WLTC test that would enter the overall result at a predefined weighting. (A more realistic weighted value could also include the lab test procedures undertaken by GreenNCAP, including also the BAB130 Highway test).

Extending the scope of the efficiency label to light commercial vehicles

The current Directive requires fuel economy labels only for passenger cars (category M1 vehicles) even though some Member States including Denmark, Spain, Poland, Sweden and Austria introduced the label also for light commercial vehicles. While van consumers already rate fuel consumption and operating highest in their purchase decision, making an energy consumption label also mandatory for vans would improve and harmonize consumer information. The data to be reflected on the label is available from type-approval also for vans. (Ricardo 2021)

To account for the higher average energy consumption of light commercial vehicles and considering the difference in use cases and therefore consumers of cars and vans, it would be justified to use different efficiency class boundaries for the two vehicle categories.

List of References

Canzler, W., Haus, J., Knie, A., & Ruhrort, L. (Eds.). (2025). *Handbuch Mobilität und Gesellschaft: Sozialwissenschaftliche Verkehrs- und Mobilitätsforschung*. Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-37557-7

Dena 2017: Studie zur Vorbereitung der Novellierung der Pkw-EnVKV, anlasslich der Umstellung des Fahrzyklus von NEFZ auf WLTP. Deutsche Energie-Agentur, Fraunhofer ISI, ifeu, PwC Legal; Auftraggeber Bundeministerium für Wirtschaft und Energie, https://www.bundeswirtschaftsministerium.de/Redaktion/DE/Publikationen/Studien/studie-vorbereitung-der-novellierung-der-pkw-envkv.pdf?__blob=publicationFile&v=1

Dena 2024: Studie zur Weiterentwicklung der Pkw-EnVKV. Deutsche Energie-Agentur, Fraunhofer ISI, Ernst & Young, ifeu, Öko-Institut, Bundesministerium für Wirtschaft und Klimaschutz. https://www.dena.de/PUBLIKATION2727

European Commission 2024: *COMMISSION STAFF WORKING DOCUMENT Accompanying the document Report from the Commission Commission report under Article 12(3) of Regulation (EU) 2019/631 on the evolution of the real-world CO2 emissions gap for passenger cars and light commercial vehicles and containing the anonymised and aggregated real-world datasets referred to in Article 12 of Commission Implementing Regulation (EU) 2021/392* (Staff Working Document No. SWD (2024) 59 final).

European Commission 2025: COMMISSION STAFF WORKING DOCUMENT Evaluation of Directive 1999/94/EC of the European Parliament and of the Council relating to the availability of consumer information on fuel economy and CO_2 emissions in respect of the marketing of new passenger cars; SWD (2025) 155 final

European Environment Agency. (n.d.): Climate and Energy in the EU - Real World Emissions. Retrieved February 26, 2025, from https://climate-energy.eea.europa.eu/topics/transport/real-world-emissions/data

European Union 2021: Acts Adopted by Bodies Created by International Agreements - UN Regulation No 154, Pub. L. No. UN Regulation No 154, 423 L 1. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:42021X2039&from=DE

Fraunhofer IZM et al. 2021: Ecodesign preparatory study on mobile phones, smartphones and tablets, Final report, https://op.europa.eu/en/publication-detail/-/publication/a7784be4-853d-11eb-af5d-01aa75ed71a1/language-en

Green NCAP. (n.d.): Official Green NCAP website—How green is your car? Retrieved February 26, 2025, from https://www.greenncap.com/

ICCT 2022: Plötz, P., Link, S., Ringelschwendner, H., Keller, M., Moll, C., Bieker, G., Dornoff, J., & Mock, P.: Real-world usage of plug-in hybrid vehicles in Europe: A 2022 update on fuel consumption, electric driving, and CO2 emissions [White Paper]. International Council on Clean Transportation. https://theicct.org/publication/real-world-phev-use-jun22/

ICCT 2024: Dornoff, J., Morales, V. V., & Tietge, U.: On the way to “real-world” CO2 values? The European passenger car market after 5 years of WLTP [White Paper]. The International Council on Clean Transportation. https://theicct.org/wp-content/uploads/2024/01/ID-76-%E2%80%93-EU-WLTP_final.pdf

ICCT 2024a: Tietge, U., Dornoff, J., & Mock, P.: CO2 emissions from new passenger cars in Europe: Car manufacturers' performance in 2023 (CO2 Emissions from New Passenger Cars in Europe) [Briefing Paper]. The International Council on Clean Transportation. https://theicct.org/publication/co2-emissions-new-pv-europe-car-manufacturers-performance-2023-sept24/

International Energy Agency 2025: Outlook for energy demand – Global EV Outlook 2025 – Analysis. Retrieved September 4, 2025, from https://www.iea.org/reports/global-ev-outlook-2025/outlook-for-energy-demand

Ricardo 2016: Gena Gibson, Achilleas Tsamis, Stephane Cesbron, Marius Biedka, Giulia Escher, Ian Skinner: Evaluation of Directive 1999/94/EC ("the car labelling Directive"). Final report. Study contract no. 40201/2015/710777/SER/CLIMA.C.2. Ricardo Energy & Environment, TEPR. European Commission.

Ricardo 2021: Charlotte Brannigan, Sofia Amaral, Iryna Sikora, Micaela Zabalo, Nikolas Hill (Ricardo); Ian Skinner (TEPR); James Lawrence, James Farrington, Carolin Reiner, Tania Loke (BIT): Technical analysis of measures to improve consumer awareness of emissions and fuel consumption of vehicles. Final Report for DG Climate Action European Commission Contract Ref. CLIMA.C4/ETU/2019/0008. Ricardo Energy & Environment, TEPR, The Behavioural Insights Team, European Commission.