

## About Tesla

Tesla's mission is to accelerate the world's transition to sustainable energy. Founded in 2003, Tesla designs, manufactures and markets fully electric vehicles and solutions for the production and storage of renewable energy, which together create a sustainable ecosystem.

Today, Tesla employs around 800 people in the UK and offers three electric car models: Model S, Model X, and Model 3, all of which offer the highest possible safety and functionality. Tesla is laser focused on making electric cars increasingly affordable for more and more people, accelerating the transition to clean transport and renewable energy production.

## Executive Summary

The UK has shown leadership in being, together with California, the first to set a phase out date for the internal combustion engine in cars and vans, to ensure that transport emissions are finally tackled in our road to zero; it is right that the lack of contribution by transport to CO<sub>2</sub> reductions is addressed. A new CO<sub>2</sub> regime for the UK will be key to ensuring that the UK delivers on the phase out of petrol and diesel vehicles in 2030 and all non-zero emission cars and vans in 2035; for completeness all non-zero emission HGVs can also be phased out by 2035<sup>1</sup>. Proposals in this submission for a Zero Emission Vehicle (ZEV) mandate plus CO<sub>2</sub> regulation can also apply to this sector.

The criteria for the sale of hybrid vehicles between 2030 and 2035 are yet to be set. We note this will be determined by the definition of “significant zero emissions capability (SZEC)” as part of this consultation – although we stress that it is desirable, and technically and economically possible to end the sale of new non-zero emission cars and vans from 2030. Battery electric vehicles already offer significant CO<sub>2</sub> savings relative to other powertrains and provide the only solution for truly achieving a zero-emission road transport system.

If Government nevertheless chooses to allow the inclusion of hybrid vehicles, when defining SZEC, it must look to the spirit of their decision to phase out the sale of new petrol and diesel vehicles from 2030. Any vehicle that does not have the ability to run continuously creating zero emissions for a meaningful range is predominantly an internal combustion engine (ICE). To continue to allow the sale of these vehicles after 2030, is contrary to the Government's own decision. Therefore, only vehicles with a chargeable battery and therefore a plug should be included. Logically, it follows that the only suitable metric must be miles of continuous zero emission range. This should be set at 100 miles to ensure consumers realistically make journeys on electric miles. There is no fundamental technological barrier that impedes PHEVs from delivering higher ranges today, it is merely the economics of complying with CO<sub>2</sub> regulations.

The UK now has the opportunity to build on the strengths of the EU regulation whilst improving on its weaknesses. Weaknesses include the lack of an explicit ZEV mandate, blurring investment signals, relatively weak CO<sub>2</sub> targets for 2025 and 2030, no annually strengthening targets, the absence of a target for 2035, and the ‘pooling’ regime. Alongside a ZEV mandate the UK should retain a CO<sub>2</sub> regulation with EU-level excess emissions premiums, to control the emissions from the overall fleet; ensuring ICE vehicle emissions are reduced as well. The key design elements of these two regulations are:

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<sup>1</sup> See consultation response to the HGV non-zero emission phase out date

*ZEV mandate*

1. **Starting target of 30% ZEV in 2023 rising to 60% in 2027** – 5 years of targets should be set, with an adjustment mechanism to ensure targets are not too low or too high.
2. **Credit value** – based on the continuous zero emission range of a vehicle regardless of technology, with a minimum range of 35 miles required to generate any credit.
3. **Maximum credit value** – available for longer range BEVs and FCEVs up to a maximum of 1.5 credits. The “average” range BEV or FCEV would be worth 1 credit and rebalanced annually.
4. **Banking** – banking and carryover should be excluded from the mechanism.
5. **Trading** – in year trading should be included.
6. **Penalties** – set at £15,000 per vehicle.
7. **Interaction with a CO<sub>2</sub> regulation** - but no direct link in terms of trading or offsetting. The CO<sub>2</sub> target must be for the whole fleet. All vehicles should be counted once using their WLTP CO<sub>2</sub> emission value.

*CO<sub>2</sub> regulation*

1. **Interaction with the ZEV mandate** - but no direct link in terms of trading, offsetting or crediting for ZEVs.
2. **Trading** - CO<sub>2</sub> credits should be traded between manufacturers in year; liquidity restrictions (e.g. the EU’s pooling mechanism) should be avoided. ZEV credits cannot count towards CO<sub>2</sub> targets. A ZEV trading market would be separate, linking the two dilutes the impacts of a ZEV mandate.
3. **Banking and carryover** - CO<sub>2</sub> Credits should not be banked or carried over.
4. **Penalty** - continue with the existing penalty structure of £86 per gCO<sub>2</sub>/km of target exceedance. This penalty level has, bar a few exceptions, proven effective.
5. **ZEV super credits** – No multiple counting of low and no emission vehicles. The EU regulation includes this - resulting in dilution of the stringency of the CO<sub>2</sub> target. Each vehicle should only count once for its WLTP emissions.

Alongside these two instruments, Government should focus on the use of three Treasury neutral measures/market based mechanisms; one to support vehicle cost differentials between ZEV and ICE; one to support charging infrastructure; and one to create a demand side pull for the supply side ZEV mandate/CO<sub>2</sub> regulation:

1. **Bonus Malus** – apply a levy to ICE vehicles based on emissions band to fund a grant for ZEVs. Only FCEV and BEV would benefit from the grant. Just £232 on average for each ICE sold would have paid for all grants given in the first half of 2021 of ZEVs.
2. **Extend the Renewable Transport Fuel Obligation to a Renewable Transport Energy Obligation** – a mechanism to provide a sustainable revenue for chargepoint operators. This mechanism has already been extended to hydrogen in transport. Not extending to electricity creates a distortion between the two main zero-emissions technologies.
3. **Corporate fleet target** – a demand side tool to support the supply side intervention of a ZEV mandate. Corporate fleets over 30 vehicles should transition to 100% ZEV for new vehicles by 2025 and for their fleets by 2030.

## **Consultation Questions**

### **Significant Zero Emission Capability**

#### **Q1 - What metric, or combination of metrics should be used to set eligibility for cars and vans between 2030 and 2035?**

It is desirable and technically and economically possible to end the sale of new non-zero emission cars and vans from 2030. There is a myriad of environmental problems with non-zero emission vehicles, ranging from technical (drivetrain controls not geared towards maximum electric use) and behavioural (drivers not plugging in often enough, or not at all). Plus, eventually two drivetrains will always be more expensive than one. In brief, an exclusive focus on ZEVs will lower the cost of net zero.

We note that Government wishes to allow the sale of certain low emission vehicles between 2030 and 2035, when defining these vehicles, Government must look to the spirit of the decision to phase out the sale of new petrol and diesel vehicles from 2030. Any vehicle that does not have the ability to run continuously creating zero emissions for a meaningful range (defined later) is predominantly an internal combustion engine (ICE).

To continue to allow the sale of these vehicles after 2030, is contrary to the Government's own decision and also overshoots the Committee on Climate Change advice of phasing out all hybrids by 2032 at the latest. Therefore, only vehicles with a chargeable battery and therefore a plug should be included. Logically, it follows that the only suitable metric must be miles of continuous zero emission range. This metric is also the most consumer friendly as it is tangible and helps consumers to understand how far they can travel without emitting CO<sub>2</sub> and how far they can travel on each charge of the battery.

#### **Q2 – For your chosen metric, what threshold should new cars and vans be required to meet from 2030?**

Using continuous zero emission range, the criteria that plug in hybrids must meet, is over 100 miles of WLTP range. Setting a meaningful range that allows consumers to drive using only the battery range should help to ensure that PHEVs reduce emissions.

There is no fundamental technological barrier that impedes PHEVs from delivering higher ranges today, it is merely the economics of complying with CO<sub>2</sub> regulation that has driven manufacturers to maximise their sales margin by selling PHEVs. Given that one manufacturer already has a PHEVs planned for 2022 with over 60 miles, requiring a range >100 miles by 2030 guarantees that only the most cost-effective and technology-efficient PHEVs will be sold on UK roads, and also supports the drive to continue to reduce the already rapidly falling costs of battery technology.

Overall, we still believe that new hybrid vehicles of any type, should not be sold post 2030, especially as The Committee on Climate Change recommended a complete phase-out by 2032 and inclusion of all types of hybridised vehicles. Battery electric vehicles already offer significant CO<sub>2</sub> savings relative to other powertrains and provide the only solution for truly achieving a zero-emission road transport system.

Today's PHEVs cannot be relied upon to tackle the UK's air pollution and climate change problems. If we must allow inclusion of these vehicles, they must deliver a useful range of over 100 miles. In real-

world driving conditions, driving a PHEV can be more polluting than a conventional fossil-fueled vehicle. This is because the internal combustion engine kicks-in and has to carry the extra dead weight of an empty battery, an unemployed electric motor, additional transmission technology, and all the associated wiring and controls. Replacing conventional fossil-fueled vehicles with PHEVs will see cars emitting harmful substances like CO<sub>2</sub>, NO<sub>x</sub> and PM for many years to come.

In addition, a Transport & Environment study<sup>2</sup> in September 2020 found that PHEV emissions are much more comparable to an ICE car than a ZEV; even if the vehicles are charged as intended. For instance, PHEVs often switch on their engine even when supposedly driving in zero emissions mode. As a result, PHEVs on average emit around 2.5 times more on the road than under test conditions.

The study concludes that over the vehicle's lifetime (including emissions generating the fuel or electricity) an average PHEV will emit about 28 tonnes of CO<sub>2</sub>. This is a little below a conventional hybrid car (33 tonnes). By comparison, a new petrol/diesel car emits 39 and 41 tonnes respectively. By contrast, a new BEV emits about 3.8 tonnes from the electricity it uses over its lifetime.

With this evidence in mind, policies to promote the shift to sustainable transport should focus on increasing the uptake of ZEVs rather than PHEVs.

### **Q3 - What other requirements could be introduced, if any, to maximise zero emission capability?**

Vehicles must be capable of rapid charging to ensure that consumers can easily add meaningful miles to their vehicles quickly, in order to avoid use the internal combustion engine. It should be noted that PHEVs typically have high CO<sub>2</sub> emissions when driving in ICE mode since: 1) the ICE in a PHEV is often less efficient than the ICE in a pure ICE vehicle to save cost; 2) the PHEV is heavier than the ICE equivalent due to the dual drivetrain; and 3) the ICE charges the battery, leading to additional CO<sub>2</sub>. Rapid charging will enable minimal dwell times for charging and also starts the behaviour change and understanding of BEVs.

Consumers should be able to easily compare the efficiency of the vehicle in electric mode, allowing them to compare vehicles on this basis not just cost, or range. Given that this "efficiency" measure is a known metric when it comes to petrol and diesel cars; miles per gallon. It may be useful for Government to require that manufacturers also disclose this to consumers.

### **Q4 – What would the impact be on different sectors of industry and society in setting an SZEC requirement, using evidence where possible?**

As we transition to ZEVs, consumers must understand what product they are really buying. Miles of continuous zero emission is a very relevant and easily understandable metric. By introducing this measure, it will naturally drive conversations around emissions from other types of vehicles and why this is the case. It will also drive conversations around charging, and understanding a vehicles capability to take a charge and at what speed, as they seek to understand where they can go with their vehicle range.

Many consumers strive to make green choices, in order to be well informed they must really understand when their vehicle is emitting CO<sub>2</sub> and when it is not. Indicative surveys have found that as much as 75% of survey respondents are not confident in the difference between hybrid and

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<sup>2</sup> [https://www.transportenvironment.org/sites/te/files/publications/2020\\_09\\_UK\\_briefing\\_The\\_plugin\\_hybrid\\_con.pdf](https://www.transportenvironment.org/sites/te/files/publications/2020_09_UK_briefing_The_plugin_hybrid_con.pdf)

battery electric cars<sup>3</sup>. Setting a continuous zero emission range unequivocally sets the direction that the focus is on zero emissions from vehicles.

### **Possible Future Frameworks**

#### **Q5 - Do you have any comments regarding Option 1, to replicate the current regulatory framework, albeit with strengthened targets, to meet our wider carbon reduction targets and phase out dates?**

Strengthened CO<sub>2</sub> regulations alone, will not deliver the clear investment signals towards the development of ZEVs. Moreover, it is known from experience that emissions reductions in real life tend to be far below those achieved in test cycles.

Instead, they must be used as a secondary measure to control the emissions from the overall fleet which will reduce as the overall penetration of ZEVs increases. Without this measure the ICE components of the fleet will have no control measures; risking increased per-mile emissions and the remaining ICE fleet becoming an outlet for obsolete technologies.

*We have grouped the answers to question 6, 7 and 8*

#### **Q6 - Do you have any comments regarding Option 2, to introduce a ZEV Mandate or sales target alongside a CO<sub>2</sub> regulation?**

#### **Q7 - Do you have any views on the government's initial preference for the regulatory approach set out in Option 2?**

#### **Q8 - Are there alternative approaches that could deliver on the government's carbon budget and 2030/2035 commitments?**

The UK should set a ZEV mandate alongside a CO<sub>2</sub> regulation from 2023. A ZEV mandate creates a focus on ZEVs on the road rather than emissions reduction. This is ultimately the outcome we need in order to ensure we can meet the 2030 end of new petrol and diesel sales and the 2035 full phase out of non-zero emission vehicles. Flexibility in compliance can be built into a ZEV mandate to ensure all car manufacturers can comply. A CO<sub>2</sub> regulation is only needed as a secondary measure to ensure that emissions in the ICE segment do not rise for lack of regulatory controls.

California and China have mandates in place that require manufacturers to put more ZEVs on the market; these programs are also interlinked with corporate average CO<sub>2</sub> regulations. While the European Union has proposed a flawed 'benchmark' mechanism that only serves to weaken net CO<sub>2</sub> controls. ZEV mandates alongside stringent CO<sub>2</sub> standards and grid decarbonisation provide for an effective policy to achieve CO<sub>2</sub> reductions. ZEV mandates can accelerate the shift to electric while providing a simpler regulatory framework to drive necessary CO<sub>2</sub> reductions from conventional vehicles.

On this basis, we agree that a ZEV mandate would guarantee a certain percentage of ZEVs being sold in the UK and that if it were implemented on its own it could have the unintended consequence of leaving a proportion of a manufacturer's fleet effectively unregulated in terms of CO<sub>2</sub>. Therefore, if

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<sup>3</sup> [https://www.renewableenergymagazine.com/electric\\_hybrid\\_vehicles/uk-consumers-not-seriously-considering-buying-an-20200908](https://www.renewableenergymagazine.com/electric_hybrid_vehicles/uk-consumers-not-seriously-considering-buying-an-20200908)

introduced, a ZEV Mandate would need to be accompanied by a CO<sub>2</sub> regulatory framework to ensure a reduction in emissions, in line with the UK's commitments.

Focussing in on a ZEV mandate - the main advantage of a well-designed mandate is that it sends a clear signal to manufacturers and other suppliers over the long-term. A ZEV mandate with penalties creates an impetus for compliance strategies, these could include<sup>4</sup>:

- Increasing ZEV availability (more stock, availability and variety of models) in that region;
- Lowering the price of ZEVs in that region to ensure the mandate is met;
- Increasing marketing efforts for ZEVs in that region; and
- Investment certainty in production capacity and Research and Development, reducing the cost of ZEVs

A ZEV mandate also:

- Creates an environment to support the emergence of new, ZEV-focused automakers including training and re-skilling for employees, which will be important to the green jobs agenda in the UK;
- Sends a signal to encourage other stakeholders to coordinate in support the emergence of ZEVs - including electricity utilities, infrastructure providers, transportation planners, consumer groups, etc. All of which will be required to ensure a transition to ZEV is delivered in the UK.

In addition, a ZEV mandate can be designed to be relatively cost-effective. One modelling study<sup>5</sup> shows that a policy can be more efficient if it sends a strong and clear signal to more quickly reduce adoption costs for electric vehicles. Ambitious and clear annual targets on the road to meeting 100% ZEV should do this for the UK.

To support a ZEV mandate, the following supporting and complimentary policies should also be implemented:

1. **Extend the Renewable Transport Fuel Obligation to a Renewable Transport Energy Obligation** – a market based mechanism to provide a sustainable revenue stream for chargepoint operators in support of charging infrastructure deployment
2. **Corporate fleet target**– a demand side tool to support the supply side intervention of a ZEV mandate
3. **Bonus Malus** – a market based mechanism to support closing the gap in ICE and ZEV vehicle purchase costs

**Extend the Renewable Transport Fuel Obligation to a Renewable Transport Energy Obligation** as in Germany and the Netherlands, to enable the inclusion of electricity within this market-based mechanism to support EV charging

The RTFO is an obligation on suppliers of fossil petrol and diesel to supply “renewable fuel”, to the UK market. The scheme works by setting an annual obligation on total transport fuel. At present, use

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<sup>4</sup> [Policy Brief](#) – Zero-emission Vehicle (ZEV) Mandate, 2020, Jonn Axsen, Director of the Sustainable Transportation Action Research Team (START), Associate Professor at Simon Fraser University

<sup>5</sup> Fox, J., J. Axsen, et al. (2017). "Picking Winners: Modelling the Costs of Technology-specific Climate Policy in the U.S. Passenger Vehicle Sector." *Ecological Economics* 137: 133-147

of electricity in transport does not qualify towards meeting this obligation, in contrast to the use of hydrogen or biofuels in transport, which do qualify.

Fuel suppliers should be able to meet their clean fuel supply targets by purchasing credits generated from renewable electricity used to charge ZEVs to ensure a level playing field for all clean transport modes.

If electricity were included, it provides the key benefits:

- (1) the potential to replace a significant portion of the public funding required for the rollout of EV charging infrastructure
- (2) provides a revenue stream for chargepoint operators, who at present, mostly struggle to make a commercial case for charging and offer electricity rates that compete with diesel
- (3) provides an additional compliance option for fuel suppliers, potentially protecting consumers from additional increases to fuel<sup>6</sup>.

The RTFO was designed to increase use of “renewable fuels” in transport. Currently electricity is excluded from this mechanism, despite reforms of similar policies in other countries. The UK should reform the RTFO into a RTEO<sup>7</sup> to allow renewable electricity used in charging electric vehicles (cars, van and HGVs) to participate within the regulation. This is consistent with the policy objective of reducing transport emissions.

The Government’s recent decision to revise the RTFO has broadened the scope regarding hydrogen. At present *“The RTFO aims to increase the use of renewable transport fuels. Hydrogen produced by electrolysis using renewable electricity, as well as biohydrogen, for example produced through methane reformation of biomethane, are supported through the scheme. In March 2021, government published a consultation on the amendments to the scheme which sought views on a number of issues related to hydrogen support, including expanding the scope of the RTFO to make renewable fuels from non-biological origin used<sup>8</sup>”*. Renewable Fuels of Non-Biological Origin (RFNBOs) used in rail, maritime and non-road will now be included.

It is inconsistent for the use of renewable electricity for RFNBO to receive credits through the RTFO regulation, yet exclude the same renewable electricity when it is used directly for charging. The Government plans to revise the primary legislation of the Energy Act to include a broadened hydrogen scope within the scheme, whilst undertaking these changes, an extension to all uses of renewable electricity in transport should be given.

Importantly, the recent Hydrogen Strategy cites the use of the RTFO as a support mechanism for hydrogen transport, where hydrogen is produced from both renewable electricity and methane reformation. Any support mechanism should apply equally to different zero-emission options i.e. extended to electricity use for charging electric vehicles (cars as well as vans and trucks)

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<sup>6</sup> Government has already increased the obligation percentage and buy-out price of the RTFO and therefore the likely maximum credit price equivalent from 30p/litre to 50p/litre, to ensure there was still an incentive to blend rather than buy out. Government’s impact assessment of this was an increase in 2p/l including VAT.

<sup>7</sup> Electricity is not defined as a fuel, therefore the scope would need to be energy. It is important to note that when the RTFO was first implemented EVs were not considered a viable route for transport, in fact in 2010 a number of years after implementation, there were just 247 EVs on the road in the UK.

<sup>8</sup> Pg. 69 [UK Hydrogen Strategy](#), August 2021

It is notable that a number of other countries have already made this change including, The Netherlands (2015), Germany (2017), France (2022) and that Belgium has also indicated it is their intent to do so. An equivalent scheme also exists in California. It should also be noted that the July 2021 proposal from the European Commission for a revised Renewable Energy Directive effectively mandates inclusion of electricity in clean fuel compliance schemes (i.e. RTFO type instruments) for all EU Member States, levelling the playing field between renewable options.

Taken together, these are clear demonstrations of the viability of this policy.

**Corporate fleet target - require fleet owners to transition to 100% zero emission vehicles for new vehicles by 2025 and for their fleets by 2030**

Given that fleet vehicles account for 54.5% of market share in car sales, and even higher amongst ZEV sales, early action can contribute considerably to vehicle uptake in the immediate term, whilst also contributing to a functioning second and third hand market.

Emissions wise, there the benefit of early action in the fleet segment on CO<sub>2</sub> reduction will also be felt especially as they tend to have an annual mileage over twice as high as private cars.

Economically, the high mileage of company cars in combination with the lower cost per mile of driving an EV means that this segment is an excellent and cost effective first mover.

It also means that private persons will have access to high quality and affordable EVs once they enter the private market, typically after 4-5 years.

Some companies have already made strong commitments to decarbonize their fleets, many of which have been noted within the EV100 fleet coalition, showing the leadership that many companies are willing to take.

Moreover, setting a mandate for company cars is about effort sharing. It is a demand side measure to support the supply side measures that are being discussed at present (e.g. ZEV mandate). It can complement the current carrots for corporate ZEV owners and drivers with a stick. Together they can ensure all sectors contribute to boosting uptake of ZEVs;

In terms of how a fleet mandate would work in practice. It would require all companies including leasing companies, with over a certain threshold of vehicles (potentially 30) to fully decarbonize their new vehicle purchases by 2025 and by 2030 ensure the entire fleet is zero emission. Any vehicles ending their lease from 2025 would move to the private market as they could not be leased into the fleet market. Any remaining non-ZEV lease vehicles would need to end their lease period by 2030.

**Introduce a Bonus Malus scheme to the UK** - The price gap between ZEVs and Internal Combustion Engine (ICE) vehicles continues to reduce but the cost differential is still a limiting factor for purchases. As a result, many have called for extensions to the Plug-in Car Grant, which is due to expire in 2022/23.

One way to address the draw on public finances required to fund the Grant could be to form a new ZEV Grant for cars and vans, and have it funded by a levy on new ICE car sales; therefore, creating a UK “bonus-malus” scheme, and meeting the objective of reducing the price gap between ICE and

## Response to the Green Paper on a New Road Vehicle CO<sub>2</sub> Emissions Regulatory Framework for the United Kingdom

ZEV at no cost to the Government. Many countries in Europe have simultaneous EV bonuses and ICE taxes.

In terms of operation, a “malus” or levy is placed on the purchase of a new ICE vehicle and this is used to fund a “bonus” or grant for ZEVs, given the contribution to reduced ICE miles driven. This tax and corresponding grant can be altered on an annual basis, to ensure the system remains in balance, as ZEV uptake increases. It should be tailored to achieve specific market uptake milestones.

By way of example, for the first half of 2021 (we have excluded 2020 due to the pandemic effects), on average £232 per new ICE<sup>9</sup> would have been sufficient to fund a £2,500 grant per new ZEV. However, this is just on average for illustration – clearly more polluting cars should pay a higher levy by emissions banding, as seen in figure 2.

A bonus-malus scheme could be achieved through Vehicle Excise Duty, using the special first-year VED for first registrations. Given this component of VED is paid up-front, this provides certainty of funding and clarity of signal to markets and consumers. Achieving clear market-share milestones should guide the level and duration of the levy and grant.

In order to ensure that the new bonus malus does not fund luxury but utility, any price caps for the bonus could be tied to vehicle range, but should also ensure no taxpayers money does is spent on optional luxury extras like leather seats etc. Range is not luxury. Long-range ZEVs are necessary to fully replace an ICE vehicle, rather than stimulate second car purchases. The price cap could be redefined to depend on range, but to also be based on the real purchase price of the vehicle, not the list price of the base model.

Longer-range vehicles are more expensive by necessity, due to the size of the battery, the most expensive component of a vehicle; they are also more likely to be displacing ICE miles fully.

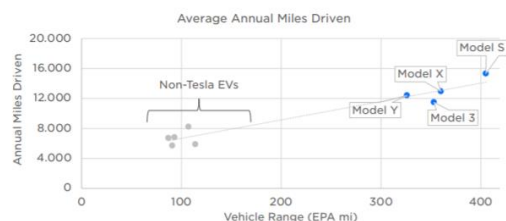
### EVs as the Primary Vehicle

#### Customers are using their Tesla as their main car

For an EV to have an impact on the environment, it must be genuinely displacing internal combustion engine miles, rather than sitting in the driveway as a secondary car used for errands or short trips only. Our data show that Tesla vehicles are being driven more than average vehicles in the U.S., suggesting that they are generally being used as a customer's primary vehicle. We fundamentally believe that you shouldn't have to choose between price, quality, usability and sustainability. An EV should be the best vehicle in every way, so consumers don't ever need to use ICE vehicles.

#### The longer the range, the higher the usage

There is a clear relationship between range, how often an EV is utilized and whether it is a primary-use vehicle. The more confident owners are that their EV can be used for commuting, errands and long road trips, the less they will feel they need to supplement their EV with an ICE vehicle. Surveys consistently indicate that the real or perceived lack of EV range is the key reason why many people do not consider replacing their ICE vehicle with an EV.



Data tracking annual miles driven during the first three years of ownership in the U.K., collected by the RAC Foundation for non-Tesla vehicles, and data on average annual miles driven by Tesla vehicles collected from our fleet show a clear relationship between an EV's range and the annual mileage driven. Tesla vehicles (shown in blue) have by far the longest range and most annual miles driven.

### Extract 1: Tesla Impact Report, EV as the primary vehicle<sup>10</sup>

Evidence from Norway from the Norwegian EV owners association<sup>11</sup> shows that the while the average EV replaces 100% of ICE miles driven 30% of the time, a long-range EV (Tesla vehicle being the proxy for this) fully replaces ICE miles driven 70% of the time (Annex 1).

<sup>9</sup> Based on SMMT figure of sales to end of July 2021 – total car sales of 1,003,269 with 85,032 BEV sales that would be eligible for the grant. - <https://www.smmt.co.uk/vehicle-data/car-registrations/>

<sup>10</sup> Tesla Impact Report 2020, p.g. 35

<sup>11</sup> See Annex 1 - Norway owners EV association owners poll data – tesla – more used in single car family

In addition to range, efficiency of a vehicle and setting a minimum requirement (in miles/kWh), could also be considered. Including the metric will create a focus on efficiency as it has done for ICE vehicles; the equivalent of miles per gallon.

Figure 1 provides examples of the *average* levy required to fund a ZEV grant at different levels of market share and continuing with the current grant amount of £2,500. It assumes that the 2.3 million new cars are sold each year in the UK car market<sup>12</sup>. Year to date the UK is at approximately 8% market share<sup>13</sup>

| ZEV market share | Total new cars | New ZEVs | New ICEVs | Grant level (£) | Total Grant pot (£) | Levy to fund Grant (£) |
|------------------|----------------|----------|-----------|-----------------|---------------------|------------------------|
| 10%              | 2,300,000      | 250,000  | 2,250,000 | 2500            | 625,000,000         | 278                    |
| 20%              | 2,300,000      | 500,000  | 2,000,000 | 2500            | 1,250,000,000       | 625                    |
| 30%              | 2,300,000      | 690,000  | 1,610,000 | 2500            | 1,725,000,000       | 1,071                  |

Figure 1 – indicative bonus-malus calculation to fund a current ZEV grant of £2,500

The level of taxation in figure 1 is clearly not representative of the damage that ICE vehicles cause to society from both a climate and air quality perspective. However, this tax would at least help to fund accelerated uptake of ZEVs, by reducing the gap in price between ICE and EV, without a draw on the public finances.

Government could also consider increasing the levy level above the required equilibrium point. This would create a slightly higher than required levy on new fossil-fuelled vehicles today, which would build up a pot to fund a grant going forward. The rationale for this is that purchasers of new fossil-fuelled vehicles should contribute somewhat to the damage that they will cause.

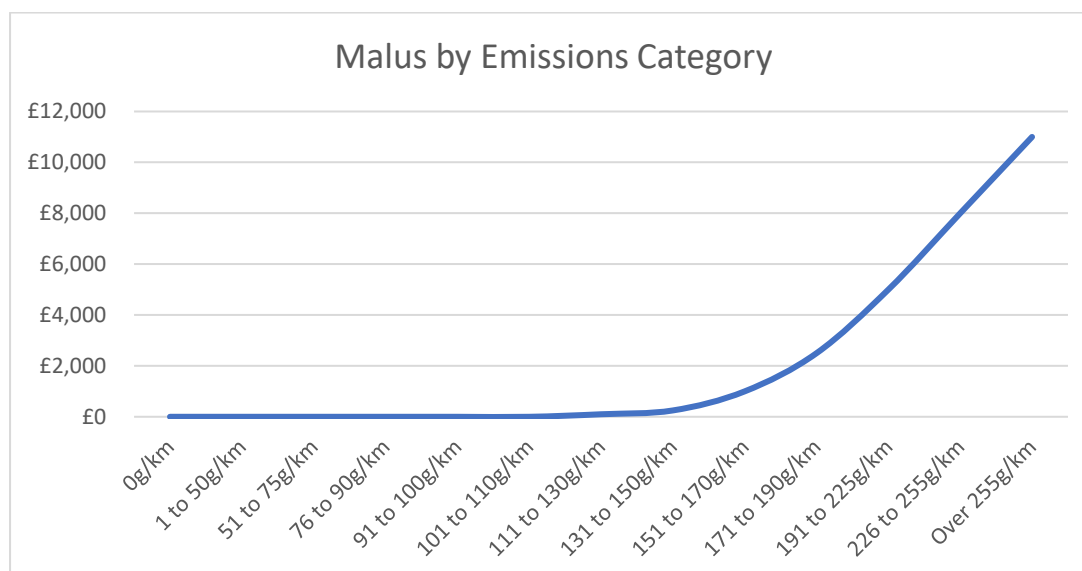


Figure 2: Example of a malus level by CO<sub>2</sub> emissions category used for VED – this malus level could fund a £3,000 bonus of ZEVs with ease and provide a surplus of funding for later years. The malus is designed to avoid impacts on lower income groups which tend to purchase smaller vehicles with relatively low CO<sub>2</sub> emissions.

<sup>12</sup> SMMT estimates 2.29m sales per year on average between 2023 and 2027 in their [central scenario](#)

<sup>13</sup> SMMT figures for [July YTD](#)

The Government should use the forthcoming Spending Review to explore the level at which a levy and grant should be set for future years to fund a serious shift from fossil-fuelled road transport to sustainable road transport. Countries such as France have successfully used this system to incentivize consumers to choose ZEVs and disincentivize the most polluting vehicles.

ZEVs in all parts of the car market should be supported as all are contributing to replacing fossil-fuelled miles driven; however range should be the eligibility factor rather than price, although we do propose a price cap linked to range that could be useful, as below. A cap linked to range would be a much more effective policy<sup>14</sup>.

A range-neutral cap can be introduced via the application of a simple formula. The effect is to ensure that an increasing range is required of EVs to benefit from the grant as the price of cars increase. Any cap must also be the total price of the vehicle including optional extras. A cap which excludes options invites the opportunity to optimize the base price to below the cap and add Options that then take the ultimate price of the vehicles above the set price cap.

Government could use a formula approximating the actual correlation between price and range. At this moment the formula could be: Price cap level = £10k + (WLTP range x £150). This can determine the price cap cut off point, where no grant would be received for that range level. This is based on an analysis of the EV market looking at the average range versus cost of vehicles, arriving at a 'cost per mile'. The formula could be revised on a regular basis to account for decreases in the cost per mile.

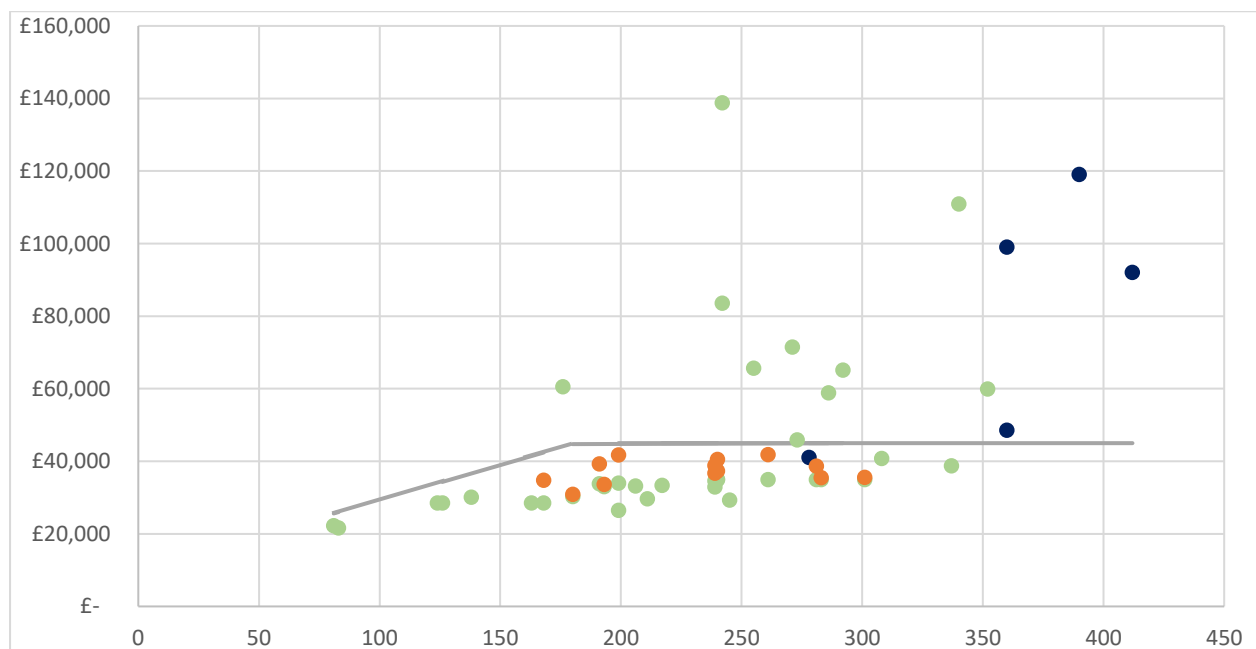


Figure 3: A formula-based range led price cap for a bonus malus scheme (grey line – capped at £45,000). The blue data is the entry level vehicle model, orange data are models where “extras” are available creating a far higher overall price. Price caps must be based on the price paid including optional extras.

<sup>14</sup> Note that the price cap associated with the current plug in car grant is set at £35,000 – the rules allows chargeable options to be added to vehicles. Even if the final price over £35,000 the vehicle remains eligible for the grant.

*We have grouped the answers to question 9, 10 and 11*

**Q9 - Do you have any views on how either, or both, of the options could be implemented?**

**Q10 - Do you have any further comments or evidence which could inform the development of the new framework?**

**Q11 - If deploying a combined ZEV Mandate and CO<sub>2</sub> regulatory framework, how should the CO<sub>2</sub> element be set?**

A ZEV mandate and CO<sub>2</sub> regulation should be in place from 2023. This is the earliest opportunity to diverge from European targets and truly lead the way in ZEV uptake. Although they must be complementary, they must also be two distinct policies with no trading of credits or offsetting between the two instruments. ICCT found that linking a ZEV mandate to CO<sub>2</sub> regulations and therefore integrating ZEVs as a compliance flexibility in meeting CO<sub>2</sub> regulations, was not effective in rapid ZEV transition. At best this approach could be reserved for reaching ZEV market shares of 5%, finding that this approach negatively affects emission levels from ICE vehicles<sup>15</sup>. Below we cover the key elements of a ZEV mandate and CO<sub>2</sub> regulation for the UK.

#### **ZEV mandate design**

A ZEV mandate must be designed to be continuously effective in driving ZEV uptake and achievable. To deliver this, there are a number of key elements:

- (i) **Targets and overall pathway to 2030/35** – set targets overall for 5 years however include adjustment mechanisms to the targets to ensure they are not too low or too high. This adjustment could be made on a one or two year cycle.
- (ii) **Credit value** – based on the continuous zero emission range of a vehicle.
- (iii) **Maximum credit value** – for longer range BEVs and FCEVs up to a maximum of 1.5 credits should be available. However, the “average” range for a BEV or FCEV would be worth 1 credit and rebalanced annually to account for increasing range. To date the average range of a BEV is approximately 250 miles and therefore would receive 1 credit.
- (iv) **Banking** – banking and carryover should be excluded from the mechanism to guard against over compliance during early easier targets and use of credits carried over rather than vehicles delivered to meet future targets.
- (v) **Trading** – In year trading should be included. The UK should not deploy the EU’s pooling mechanism which is beset with problems and seriously decreases market liquidity for a variety of reasons
- (vi) **Penalties** – around £15,000 per vehicle would be in line with other mandates globally<sup>16</sup>
- (vii) **Interaction with a CO<sub>2</sub> regulation** - but no direct link in terms of trading or offsetting. The CO<sub>2</sub> regulation covered later must cover the whole fleet. ZEVs or PHEVs sold within the ZEV mandate will count towards meeting the CO<sub>2</sub> target, however importantly they will only be counted once using their WLTP CO<sub>2</sub> emission value.

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<sup>15</sup> Zero Emission Vehicle Mandate Briefing, [ICCT](#), 2019

<sup>16</sup> [Driving the Market for Plug-in Vehicles](#): Understanding ZEV Mandates. Davis, California, USA, Institute of Transportation Studies, University of California, Davis

## Target setting

The basis for a ZEV mandate and complementary, but not linked CO<sub>2</sub> regulatory framework can both be derived from the forecasted development of the powertrain mix, alongside the requirements of meeting carbon budgets and the overall 2030/35 ICE phase out dates. We have undertaken our own modelling for targets for a ZEV mandate (covering BEV, PHEV and FCEV) and CO<sub>2</sub> regulation (overall fleet emissions including ZEVs). Figure 4 sets out a pathway that would be achievable, based on publicly available data, figure 5 sets out the complementary CO<sub>2</sub> regulation, this accounts for the reductions delivered by ZEVs under the mandate, alongside ICE vehicles.

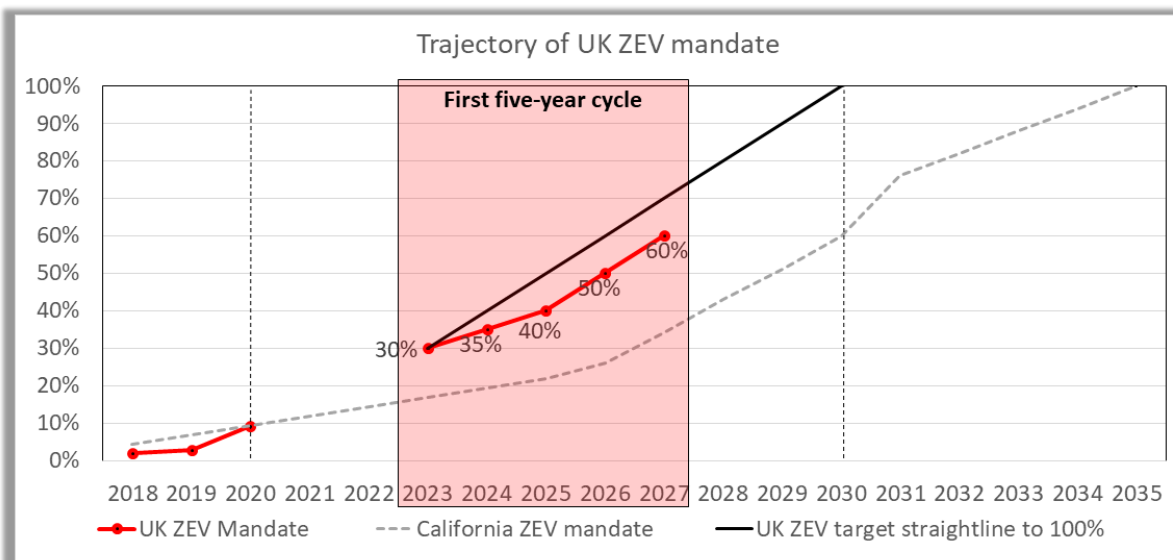


Figure 4: ZEV mandate targets based on industry forecasts of vehicle penetration under the 2030/35 ICE phase out dates.

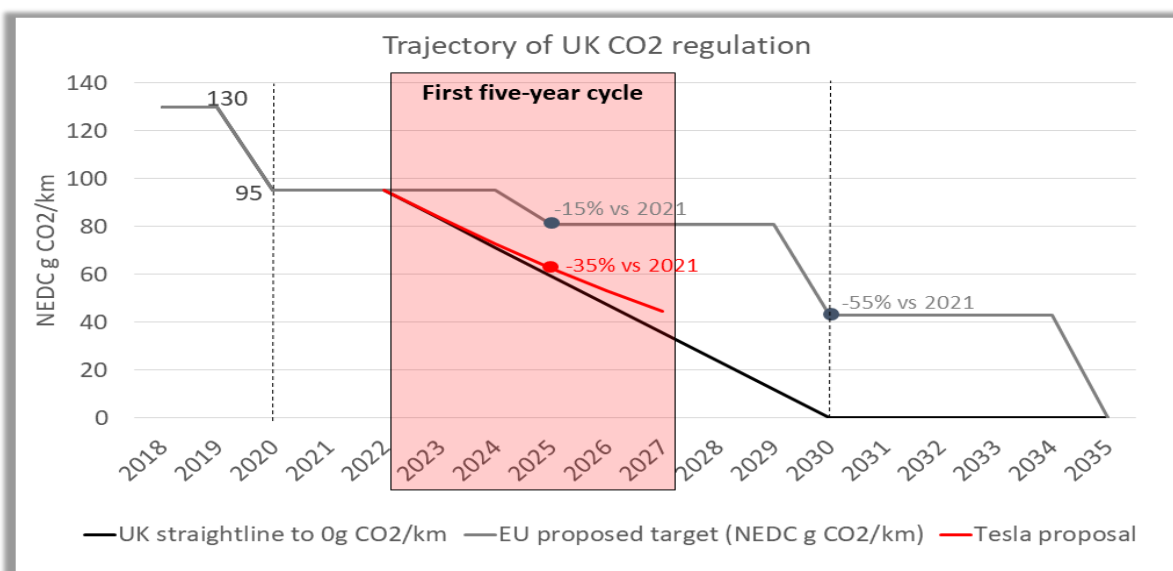


Figure 5: The complementary CO<sub>2</sub> regulation which must not be linked to the ZEV mandate or allow any offsetting or use of ZEV credits.

These pathways are based on the powertrain penetration required to comply with the ZEV mandate. The complementary CO<sub>2</sub> element in figure 5 can be set by applying these shares to the average emissions for each powertrain and therefore creating the overall fleet emission value in the pathway. For example, data from the EEA<sup>17</sup> shows that the average diesel vehicle sold in the UK emitted 132.9 g CO<sub>2</sub>/km in 2020. Future forecasts of emissions reduction per powertrain can reasonably be based off the industry rule of thumb of a 1% emissions reduction per year for mature technologies (Diesel/Petrol powertrains) and slightly higher for new technologies (mild hybrids, PHEVs etc).

The combining of the powertrain mix forecasts and the average emissions per powertrain is what can be used to set the annual targets for the CO<sub>2</sub> element which can be stringent yet achievable for the UK from 2023 onwards.

In terms of setting a pathway and ensuring that the policies continue to be effective, we propose that an overall pathway is set out for 5 years, however, a mechanism should exist to amend the pathway should it become ineffective. In California, industry was able to over comply with the ZEV mandate unfortunately, there was no mechanism to adjust the compliance pathway.

#### **ZEV credit value – based on the continuous zero emission range of a vehicle**

Only PHEVs, BEVs and FCEVs should be included within the ZEV mandate and the credit value should be based upon the range alone for simplicity; although for PHEVs a minimum threshold of 35 miles should apply in order to qualify for a credit. Given that HEVs cannot run on a continuous zero emission range they would be excluded from ZEV credits, however they would still contribute to meeting CO<sub>2</sub> targets in the CO<sub>2</sub> regulation.

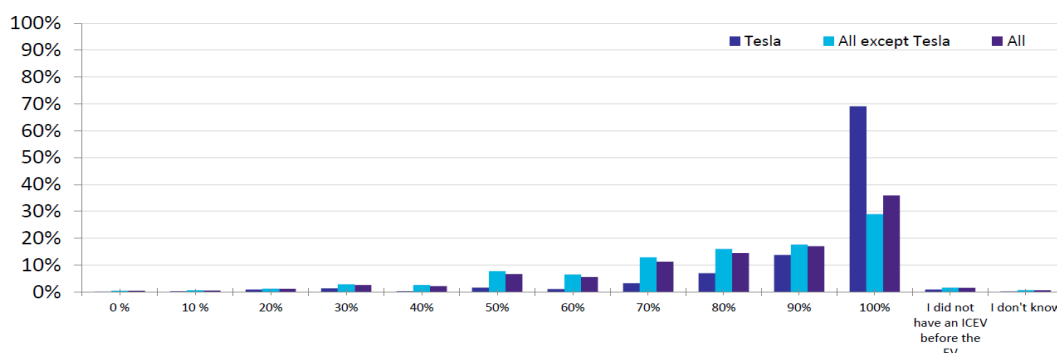
Long-range ZEVs are necessary to fully replace a fossil-fuelled vehicle, rather than stimulate second car purchases; they are also more likely to be displacing ICE miles fully. Evidence from Norway from the Norwegian EV owners association shows that while the average EV replaces 100% of ICE miles driven 30% of the time, a long-range EV (Tesla vehicle being the proxy for this) fully replaces ICE miles driven 70% of the time<sup>18</sup>

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<sup>17</sup> [EEA data](#)

<sup>18</sup> Data from Norwegian EV owners survey indicating how long-range EVs replace petrol or diesel cars to a far greater extent than short-range EVs. Source: Norwegian EV Owners Association Survey, 2018.

## To what extent do you estimate that your EV has replaced the use of the ICEV?



The average range BEV and FCEV should be worth 1 credit for simplicity, however, to incentivise longer range and efficiency gains, the highest value should be 1.5 for those vehicles with significantly longer range (covered below in super credits). The credit value, regardless of technology could be a simple formula based upon range, as shown below. Importantly, to be eligible for ZEV credits, as previously mentioned, the minimum range must be 35 miles of continuous electric range<sup>19</sup> - therefore, incentivising zero emission miles, regardless of technology. It also allows those manufacturers that have not yet fully pivoted to pure ZEVs to still have a compliance mechanism for the ZEV mandate, and the additional option of trading in ZEV credits.

### Illustrative credits formula

= 0.004 x WLTP all electric range [capped at 1.5 credits]

A ZEV crediting framework based on this formula would mean that the average BEV, which today has a range of 250 miles, earns 1 ZEV credit per car. A vehicle with a range of 375 miles today would get the maximum credit of 1.5. Each year the average would be re-based to ensure that the mechanism only ever gave 1 credit for the average range of an EV and the overall ZEV target was not diluted by the increasing range of vehicles. By 2030, if the average PHEV has a range of 100 miles then this vehicle will earn 0.4 ZEV credits. Range is defined as the WLTP all-electric range.

This ensures that high-quality, long-range BEVs, which have the best chance of replacing ICE vehicles to the average consumer, are supplied to the UK market in the coming years.

As PHEVs are realistically more akin to ICE vehicles than ZEVs based on emission data, there is an argument that they should be excluded from a ZEV mandate. However, in recognition that without PHEV inclusion many manufacturers would struggle to comply, PHEVs should be included but with a credit value proportionate to the miles that can be driven on the battery alone. Their value must be less, sending a market signal that ZEVs with meaningful range are the ultimate goal. It is important to ensure that ZEV mandates do not drive the uptake of PHEVs as these are a transitional technology and also lock in ICE emissions, therefore reducing the overall effectiveness of a ZEV mandate.

<sup>19</sup> Based on similar calculations for the California ZEV mandate, although they discriminate between PHEVs and ZEV and have a sub target cap for PHEVs to limit their contribution.

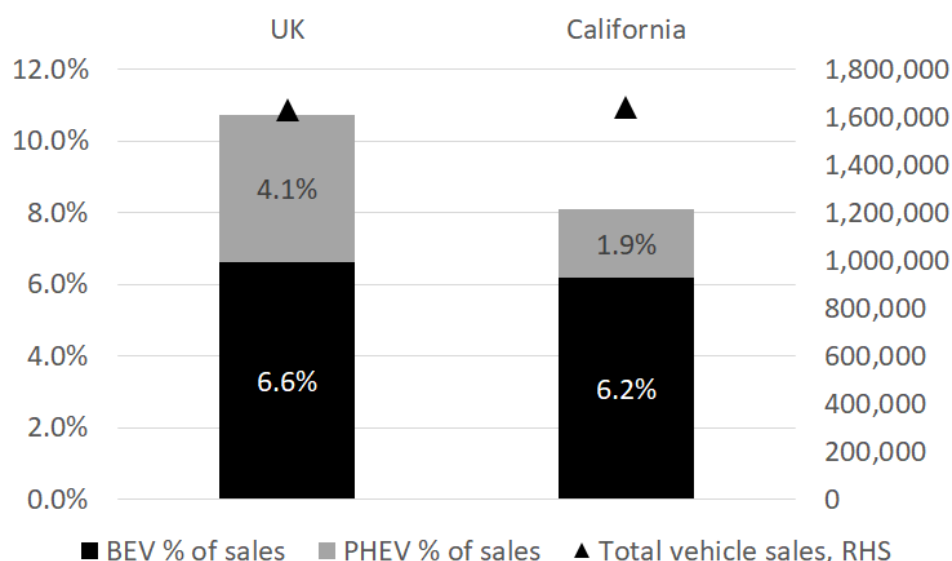


Figure 6 shows the difference in vehicle uptake of PHEV versus BEVs for the UK CO<sub>2</sub> based policies and California based ZEV policies<sup>20</sup>. This demonstrates that well designed ZEV mandates incentivise truly zero emission vehicles, not PHEVs that are more akin to ICE vehicles. It is also the case that the supporting financial and taxation measures that sit beside a ZEV mandate also contribute to this overall impact<sup>21</sup>.

In the California ZEV mandate the maximum credit value for a PHEV is 1.1 versus 4 for a long range BEV. This differential between the two technologies has generally ensured that more BEVs enter the marketplace, whilst also providing flexibility for manufacturers (although note the issues on 4 times supercredits highlighted in casestudy 1 below). There are also sub-categories for drivetrains to ensure that PHEV penetration is controlled. However, we would not propose a sub target for PHEVs, BEVs and FCEVs as seen in California, as this further complicates the regulation. Instead a robust credit value formula should provide a control mechanism - a credit proportionate to range should provide the right incentives for BEV/FCEV when compared to the lower zero emission range of PHEVs.

**Maximum credit value** – a maximum of 1.5 credits should be available for longer range BEVs and FCEVs

Supercredit schemes exist in China and California with the maximum credit for a ZEV with the highest range reaching 6 credits and 4 credits respectively.

Whilst it is right to recognise the value of longer-range vehicles given their displacement of ICE vehicles, we must ensure supercredits do not dilute the overall target, or worst still provide room for high headline targets yet lower numbers of vehicles on the road.

Instead, we suggest that a formula based upon range is applied up to a maximum value of 1.5 credits. An annual calculation should also occur to ensure that the average BEV and FCEV receives just 1 credit. This is to ensure that the expected continued increases in range as efficiency further

<sup>20</sup> Based on data from the SMMT and [California New Car Dealers Association](#)

<sup>21</sup> See Annex A for these

develops do not lead to higher credit values for the average BEV/FCEV therefore meaning less ZEVs would be needed to hit the compliance target.

**Casestudy 1: California ZEV mandate 4 times supercredits – why this should not be replicated**

One of the major issues facing ZEV mandate design in jurisdictions such as California is oversupply of credits resulting from issuing supercredits of up to 4 ZEV credits per vehicle and unlimited credit banking. While Tesla supports the principle that innovation is driven through ZEV mandates which recognize and promote long-range vehicles, ZEV programs with high supercredit multipliers must reconcile the fact that multiple credits are being issued per ZEV by significantly increasing the ZEV mandate percentage to ensure overall targets are met (e.g. 200% ZEV target to achieve 50% BEV sales), which is difficult for policy makers and the public alike to understand. Tesla also believes certain flexibilities are appropriate, however limits on long-term credit banking are also important to ensure credits from over-compliance in one period are not rolled indefinitely into future periods, thereby undermining future stringency.

To illustrate this point more directly, in 2017, Tesla filed comments with the California Air Resources Board in which it noted that the oversupply of credits represented a loss of between 48% and 61% of the anticipated market share of EVs in the 2018-2025 period, relative to the policy intent established in 2012. This loss was attributable to over supply of credits. Tesla further noted that Automakers could therefore comply for almost a decade with little-to-no-increase in ZEV sales as a percentage of total vehicle sales. This oversupply of credits must now be addressed through more current rulemaking. The lesson here is that implementing super credits of up to 4 times for each ZEV and allowing banking of credits creates an oversupply that will need to be addressed down the line. Therefore, having learned this lesson in other geographies it would be prudent to work on the basis of the average range of a ZEV with a value of 1 credit and no banking mechanism.

**Banking – banking and carryover should be excluded from the mechanism**

In California, there has been an excess of ZEV credits created by supercredits, over compliance and banking, and targets that are too low. To guard against over compliance during early easier targets and use of credits carried over rather than vehicles delivered to meet the target, banking and carryover should not be included. This is seen within China's ZEV mandate called the "New Energy Vehicle Mandate". However, if the ZEV mandate was implemented from 2023, one year of carryover should be considered, to provide more flexibility in compliance.

**Trading – In year trading should be included**

Trading ZEV credits is an effective way to provide flexibility in compliance to those manufacturers still pivoting towards pure ZEVs. This is used in the California ZEV mandate. Market liquidity should be maximised, to reduce the cost of net zero. Liquidity-reducing mechanisms akin to the EU's pooling should be avoided.

**Penalties – a value of around £15,000 per vehicle to ensure manufacturing an EV was a better route than fines**

California sets a penalty of \$5,000 per credit<sup>22</sup>, which in effect sets the maximum credit value, after which a manufacturer would simply pay the fine. Provided the penalty is set at a level which still encourages manufacturing this is the better route, rather than the mechanism used in China, which sets an exclusion for new type approvals. In California no manufacturer has yet been fined. This suggests that either the level is enough of a deterrent or the targets are too low. However, noting that the maximum credit a BEV can receive in California is 4 credits, a penalty of \$5,000 per credit equates to a maximum of \$20,000. On this basis a penalty in the region of £15,000 might be appropriate.

The EU's penalty level is €95 per gCO<sub>2</sub>/km per car. Assuming an EV displaces a 100 g/km ICE car and a supercredit value of 2, this translates into €19,000 per EV; again, a similar range as the proposed £15,000 for the UK.

**Interaction with a CO<sub>2</sub> regulation** - but no direct link in terms of trading, offsetting or crediting for ZEVs

The CO<sub>2</sub> regulation alongside a ZEV mandate must cover the full fleet in the UK, whereby all vehicles sold in the UK will be counted in the meeting the CO<sub>2</sub> target. However, the CO<sub>2</sub> regulations **must not** be directly linked to the ZEV mandate and compliance credit mechanisms.

By way of example, China has Corporate Average Fuel Consumption (CAFC) targets, in effect the same as a CO<sub>2</sub> regulation. In China, they link their CO<sub>2</sub> regulation with their ZEV mandate (New Energy Vehicle mandate) and NEV credits can be used to offset obligations under the CAFC targets. This decision to directly link the NEV mandate to fleet-average fuel consumption targets is in contrast to California's decision to phase out such linkages.

A link creates a risk of over compliance with the NEV mandate and use of excess NEV credits to offset CAFC requirements. The effect is manufacturers can continue to sell petrol and diesel vehicles with higher CO<sub>2</sub> emissions. Within a CO<sub>2</sub> regulation the following should be also considered:

- 1. Trading:** CO<sub>2</sub> credits should be freely traded between manufacturers in year; a liquidity-restricting scheme akin to the EU's pooling mechanism should be avoided. ZEV credits cannot count towards CO<sub>2</sub>. A ZEV trading market would be separate, linking the two as previously mentioned dilutes the impacts of a ZEV mandate
- 2. Banking and carryover:** CO<sub>2</sub> credits should not be banked or carried over. Evidence suggests that over compliance is delivered in earlier years, where targets are lower and used in later years, therefore reducing actual emission reductions (see figure 7)

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<sup>22</sup> [Driving the Market for Plug-in Vehicles](#): Understanding ZEV Mandates. Davis, California, USA, Institute of Transportation Studies, University of California, Davis

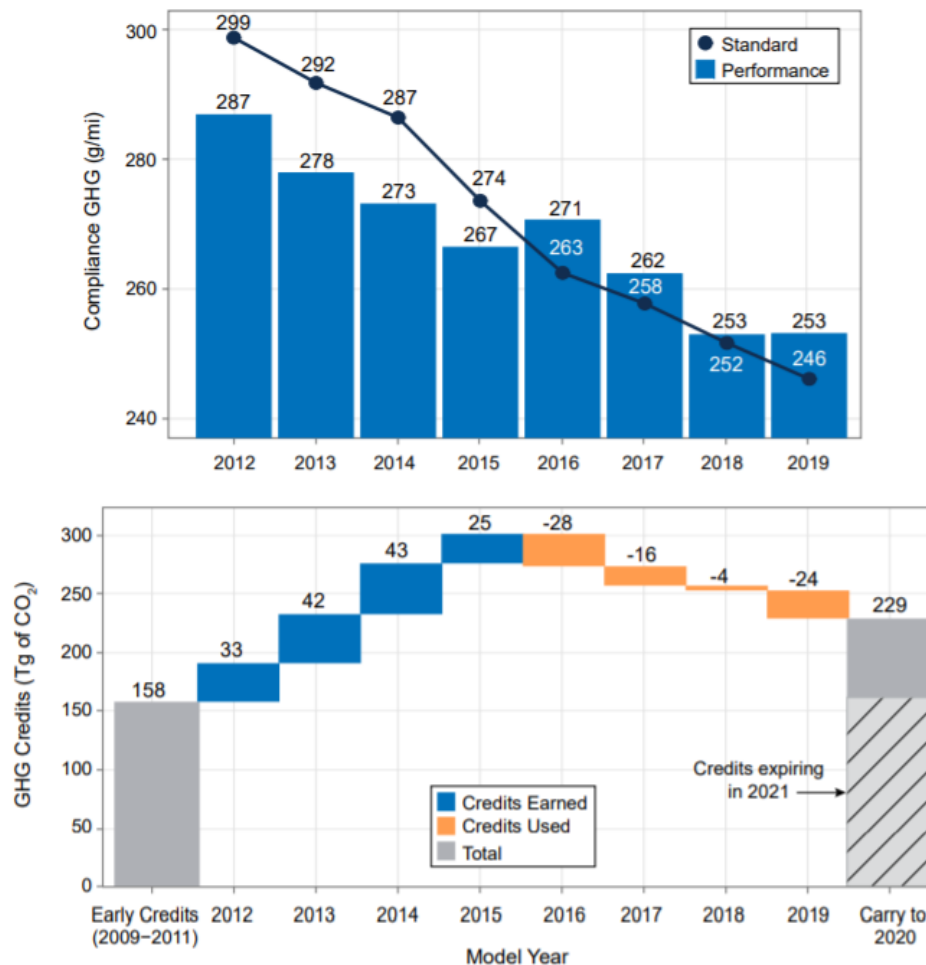


Figure 7: Impact of credit generation banking and rollover. The graph shows EPA data on industry Performance and Standards, Credit Generation and Use. Overall industry has used credits for the fourth year in a row to maintain compliance, but there remains a large bank of credits for future. This demonstrates the impact of banking and carryover- credits are earned in less stringent earlier years and carried over and used in later years where compliance is harder.<sup>23</sup>

### 3. Penalty - continue with the existing penalty structure

The existing EU CO<sub>2</sub> regulation sets out a penalty whereby if the average CO<sub>2</sub> emissions of a manufacturer's fleet exceed its specific emission target in a given year, the manufacturer has to pay – for each of its vehicles newly registered in that year – an excess emissions premium of £86 per g CO<sub>2</sub>/km of target exceedance. This penalty level has, bar a few exceptions, proven effective.

### 4. ZEV super credits – No super credits for low and no emission vehicles

Within the calculation for the overall emissions of the fleet, there should be no multiple counting of low and no emission vehicles. The EU regulation allows multiple counting or “supercredits”, resulting in dilution of the stringency of the CO<sub>2</sub> target. Each vehicle should only count once for its WLTP emissions contribution towards the manufacturers overall CO<sub>2</sub> target.

<sup>23</sup> [EPA Automotive Trends Report](#), 2021

**Q12 - Should the focus be on delivering the largest possible CO<sub>2</sub> savings, or the quickest possible switch to zero emission mobility?**

By implementing a ZEV mandate this drives large CO<sub>2</sub> savings through the presence of ZEVs on the road, rather than the incremental savings driven by the reduction of CO<sub>2</sub> across the fleet annually.

**Q13 - How do we ensure that the target allows for sufficient supply of low and zero emission vehicles; supports investment in the UK; and delivers our carbon reduction commitments?**

See grouped questions 9, 10 and 11

**Derogations and Exemptions**

**Q14 - Should the new regulatory framework include exemptions or modified targets for certain specialist vehicles and/or niche and small volume manufacturers?**

Switzerland is considering removing the derogation for small volume manufacturers from as early as 2022.

It can be challenging for niche and small volume manufacturers to adhere to the full regulatory framework with their limited vehicle range. At the same time, it is important not to dilute the ZEV signal though and to also encourage these manufacturers to invest in ZEV drivetrains. What's more, any shortfall can be freely traded. Therefore, a proposal for these manufacturers could be to keep ZEV obligations the same, whilst allowing somewhat more leniency on CO<sub>2</sub> reduction. Another proposal could be to allow these OEMs more flexibility in how to achieve their targets, e.g. by allowing them some flexibility between CO<sub>2</sub> and ZEV rules, which is not allowed for high-volume manufacturers.

**Credit Levels**

**Q15 - Should credits be awarded to vehicles that meet the SZEC definition?**

ZEV credits should be awarded to all PHEVs over 35 miles and BEVs. Within the CO<sub>2</sub> element there should not be multiple crediting of vehicles which comply with the SZEC definition. This would dilute the stringency of the CO<sub>2</sub> targets and place de facto caps on ZEV deployment, as seen with the used of Super Credits in the EU in 2020.

**Q16 - If so, should this be a fixed number of credits, or should there be a sliding scale that recognises the difference in CO<sub>2</sub> efficiency of various SZEC-compliant vehicles?**

N/A – no extra crediting within CO<sub>2</sub> framework is advised.

**Credit banking and trading**

*We have group Q17 and Q18*

**Q17 - Should this be considered within the new framework?**

**Q18 - If so, over what timeframe should they remain usable and should credits and debits be treated the same or differently?**

We recommend the UK continues the framework established in the European Union and Switzerland where there is an annual requirement to comply with CO<sub>2</sub> targets. Credits cannot be banked forward for future use nor deficits carried forward. This ensures maximum stringency on an annual basis

**Q19 - Within the trading element of the new scheme, should there be limits on the number of certificates/grams of CO<sub>2</sub> that can be bought or sold?**

No limits should be set on the number of credits that can be traded. A limit on credit trading will set a de facto ceiling on supply of ZEVs into the UK market.

**Q20 - Should such a market cover the whole of road transport or should there be some constraints imposed on trading across manufacturing sectors (e.g. cars and Heavy Duty Vehicles)? Levels of fines for non-compliance**

**Q21 - How, and at what level, should fines be set in the new UK regulatory framework and should this vary for different vehicle types?**

California has a penalty of \$5,000 per ZEV credit, cars earn up to 4 ZEV credits per car so the penalty is actually \$20,000 per vehicle or ~ £15,000

**Real-World Emissions**

**Q22 - Would there be benefits in seeking to ensure any CO<sub>2</sub> targets in the new UK regulatory framework take into account real-world emissions data alongside the lab-tested WLTP CO<sub>2</sub> emissions figures? If so, how might the two be linked?**

Yes, it would be useful to implement a control measure on CO<sub>2</sub> emissions from WLTP figures. We know that previously a large gap between NEDC and real-world emissions appeared, and we must ensure that this is not replicated under the new WLTP test.

Continued monitoring of WLTP emissions versus real world data should be undertaken and correction factors should be applied to CO<sub>2</sub> targets.

Looking at the example of NEDC test cycles and WLTP versus real world emissions, evidence from the ICCT<sup>24</sup> found that WLTP type-approved vehicles from the year 2018, on average, emit about 14% more CO<sub>2</sub> under real-world driving conditions than suggested by the official WLTP figures. This was compared to a high of around 40% for NEDC type-approved vehicles, which we have now clearly made the switch away from.

It is worth highlighting that within the switch over from NEDC to WLTP in Europe (prior to Brexit), the procedure for determining 2025 and 2030 fleet CO<sub>2</sub> targets was switched from declared to measured values. Although for 2021–2024 fleet targets remain based on *declared* WLTP CO<sub>2</sub> values. Therefore, leaving space for real world emission versus WLTP gaps to appear. UK measures within any new CO<sub>2</sub> regulation (and ZEV mandate) should account for any corrections that would be

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<sup>24</sup> On the Way to Real World CO<sub>2</sub>, [ICCT](#),

needed to cover this period of three years. In short, if a gap in WLTP declared emissions values and real world emissions values is identified, the CO<sub>2</sub> regulation should be adjusted to correct for this.

### **Extending the Framework to All Road Vehicles Heavy Duty Vehicles**

**Q23 - For vehicle sub-categories that are not yet covered by VECTO, could a ZEV Mandate/sales target be extended before VECTO is adapted?**

Yes. VECTO is primarily a tool to establish certified CO<sub>2</sub> emissions, to enable CO<sub>2</sub> standards to be set. Setting a ZEV mandate can be done regardless whether the diesel equivalent has an official CO<sub>2</sub> value. To put it simply: A ZEV target could be set even if there were no VECTO at all.

**Q24 - Would there be any unintended consequences of establishing a ZEV Mandate for certain vehicle sub-categories before a CO<sub>2</sub>-based regulation?**

To the contrary. In the absence of CO<sub>2</sub> regulation, a ZEV target gives urgently necessary innovation signals to the segment

**Q25 – Do you have any views on imposing a CO<sub>2</sub> regulation on vehicle types that are not yet covered by a CO<sub>2</sub> test procedure, or existing regulation, particularly in light of the planned future phase out consultation for new non-zero emission buses? L-Category vehicles (Motorbikes, Mopeds, Quad Bikes etc)**

N/A

### **L-Category vehicles (Motorbikes, Mopeds, Quad Bikes etc)**

**Q26 - Should the preferred regulatory approach be extended to all L-category vehicles or should the diversity of the sector (motorbikes, mopeds, motorised tricycles, quadbikes, motorised quadricycles etc) necessitate different approaches?**

N/A

### **Additional issues for consideration**

**As the regulations develop, all potential aspects listed in chapter 5 will need to be considered for each vehicle type. Therefore, we would welcome any additional views on the application of the variables mentioned from paragraph 5.50 onwards, in respect of new HDVs (including the adaptations that should be made for different HDV types) and L category vehicles.**

A ZEV mandate and linked CO<sub>2</sub> measure can be applied to HGVs in the same manner as for cars and vans. The EU is currently developing a WLTP measure for HGVs, which the UK should adopt to enable the use of a CO<sub>2</sub> measure. A ZEV mandate could be applied to HGVs without any interventions. As

per our response on the phase out date for non-zero emission HGVs and for completeness. The phase out date should be set at 2035 for all weights of HGVs as there are no technological barriers precluding longer range, heavier e-trucks from coming forward. It is merely regulatory barriers around weight restrictions and design.

Inexplicably, the EU CO<sub>2</sub> regulation for HGVs does not allow for credit trading between vehicle manufacturers. This increases the cost of reaching net zero, and makes it harder to set challenging targets. The UK has an excellent opportunity to go significantly further than the EU in terms of targets, whilst providing industry with more flexibilities in the means to achieve the targets – notably credit trading.

**Annex A – Market Based Mechanism/treasury neutral policies to support a ZEV mandate**

To support a ZEV mandate the following supporting and complimentary policies should also be implemented:

1. **Extend the Renewable Transport Fuel Obligation to a Renewable Transport Energy Obligation** – a market based mechanism to provide a sustainable revenue stream for chargepoint operators in support of charging infrastructure deployment
2. **Corporate fleet target**– a demand side tool to support the supply side intervention of a ZEV mandate
3. **Bonus Malus** – a market based mechanism to support closing the gap in ICE and ZEV vehicle purchase costs

**Extend the Renewable Transport Fuel Obligation to a Renewable Transport Energy Obligation as in Germany and the Netherlands, to enable the inclusion of electricity within this market-based mechanism to support EV charging**

The RTFO is an obligation on suppliers of fossil petrol and diesel to supply “renewable fuel”, to the UK market. The scheme works by setting an annual obligation on total transport fuel. At present, use of electricity in transport does not qualify towards meeting this obligation, in contrast to the use of hydrogen or biofuels in transport, which do qualify.

Fuel suppliers should be able to meet their clean fuel supply targets by purchasing credits generated from renewable electricity used to charge ZEVs to ensure a level playing field for all clean transport modes.

If electricity were included, it provides the key benefits:

- (1) the potential to replace a significant portion of the public funding required for the rollout of EV charging infrastructure
- (2) provides a revenue stream for chargepoint operators, who at present, mostly struggle to make a commercial case for charging and offer electricity rates that compete with diesel
- (3) provides an additional compliance option for fuel suppliers, potentially protecting consumers from additional increases to fuel<sup>25</sup>.

The RTFO was designed to increase use of “renewable fuels” in transport. Currently electricity is excluded from this mechanism, despite reforms of similar policies in other countries. The UK should reform the RTFO into a RTEO<sup>26</sup> to allow renewable electricity used in charging electric vehicles (cars, van and HGVs) to participate within the regulation. This is consistent with the policy objective of reducing transport emissions.

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<sup>25</sup> Government has already increased the obligation percentage and buy-out price of the RTFO and therefore the likely maximum credit price equivalent from 30p/litre to 50p/litre, to ensure there was still an incentive to blend rather than buy out. Government’s impact assessment of this was an increase in 2p/l including VAT.

<sup>26</sup> Electricity is not defined as a fuel, therefore the scope would need to be energy. It is important to note that when the RTFO was first implemented EVs were not considered a viable route for transport, in fact in 2010 a number of years after implementation, there were just 247 EVs on the road in the UK.

The Government's recent decision to revise the RTFO has broadened the scope regarding hydrogen. At present *"The RTFO aims to increase the use of renewable transport fuels. Hydrogen produced by electrolysis using renewable electricity, as well as biohydrogen, for example produced through methane reformation of biomethane, are supported through the scheme. In March 2021, government published a consultation on the amendments to the scheme which sought views on a number of issues related to hydrogen support, including expanding the scope of the RTFO to make renewable fuels from non-biological origin used<sup>27</sup>".* Renewable Fuels of Non-Biological Origin (RFNBOs) used in rail, maritime and non-road will now be included.

It is inconsistent for the use of renewable electricity for RFNBO to receive credits through the RTFO regulation, yet exclude the same renewable electricity when it is used directly for charging. The Government plans to revise the primary legislation of the Energy Act to include a broadened hydrogen scope within the scheme, whilst undertaking these changes, an extension to all uses of renewable electricity in transport should be given.

Importantly, the recent Hydrogen Strategy cites the use of the RTFO as a support mechanism for hydrogen transport, where hydrogen is produced from both renewable electricity and methane reformation. Any support mechanism should apply equally to different zero-emission options i.e. extended to electricity use for charging electric vehicles (cars as well as vans and trucks)

It is notable that a number of other countries have already made this change including, The Netherlands (2015), Germany (2017), France (2022) and that Belgium has also indicated it is their intent to do so. An equivalent scheme also exists in California. It should also be noted that the July 2021 proposal from the European Commission for a revised Renewable Energy Directive effectively mandates inclusion of electricity in clean fuel compliance schemes (i.e. RTFO type instruments) for all EU Member States, levelling the playing field between renewable options.

Taken together, these are clear demonstrations of the viability of this policy.

### **Require fleet owners to transition to 100% zero emission vehicles for new vehicles by 2025 and for their fleets by 2030**

Given that fleet vehicles account for 54.5% of market share in car sales, and even higher amongst ZEV sales, early action can contribute considerably to vehicle uptake in the immediate term, whilst also contributing to a functioning second and third hand market. Emissions wise, there the benefit of early action on CO<sub>2</sub> reduction will also be felt especially as they tend to have an annual mileage over twice as high as private cars. Economically, the high mileage of company cars in combination with the lower cost per mile of driving an EV means that this segment is an excellent and cost effective first mover. It also means that private persons will have access to high quality and affordable EVs once they enter the private market, typically after 4-5 years. Some companies have already made strong commitments to decarbonize their fleets, many of which have been noted within the EV100 fleet coalition, showing the leadership that many companies are willing to take.

Nonetheless, setting a mandate for company cars is about effort sharing. It is a demand side measure to support the supply side measures that are being discussed at present (e.g. ZEV mandate). It can complement the current carrots for corporate ZEV owners and drivers with a stick. Together they can ensure all sectors contribute to boosting uptake of ZEVs;

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<sup>27</sup> Pg. 69 [UK Hydrogen Strategy](#), August 2021

In terms of how a fleet mandate would work in practice. It would require all companies including leasing companies, with over a certain threshold of vehicles (potentially 30) to fully decarbonize their vehicle fleet and by 2030 ensure the entire fleet is zero emission. In practice, this would mean that all new fleet vehicles would be zero emission from 2025. Any vehicles ending their lease from 2025 would move to the private market as they could not be leased into the fleet market. Any remaining non-ZEV lease vehicles would need to end their lease period by 2030

### **Introduce a Bonus Malus scheme to the UK**

The price gap between ZEVs and Internal Combustion Engines (ICE) continues to reduce but the cost differential is still a limiting factor for purchases. As a result, many have called for extensions to the Plug-in Car Grant, which is due to expire in 2022/23.

One way to address the draw on public finances required to fund the Grant could be to form a new ZEV Grant for cars and vans, and have it funded by a levy on new fossil-fueled car sales; therefore, creating a UK “bonus-malus” scheme, and meeting the objective of reducing the price gap between ICE and ZEV at no cost to the Government.

In terms of operation, a “malus” or levy is placed on the purchase of a new fossil-fueled vehicle and this is used to fund a “bonus” or grant for ZEVs, given the contribution to reduced ICE miles driven. This tax and corresponding grant can be altered on an annual basis, to ensure the system remains in balance, as ZEV uptake increases. It should be tailored to achieve specific market uptake milestones. By way of example, for the first half of 2021 (we have excluded 2020 due to the pandemic effects), on average £232 per new ICE<sup>28</sup> would have been sufficient to fund a £2,500 grant per new ZEV. However, this is just on average for illustration – clearly more polluting cars should pay a higher levy by emissions banding, as seen in figure 2.

A bonus-malus scheme could be achieved through Vehicle Excise Duty, using the special first-year VED for first registrations. Given this component of VED is paid up-front, this provides certainty of funding and clarity of signal to markets and consumers. Achieving clear market-share milestones should guide the level and duration of the levy and grant.

In order to ensure that the new bonus malus does not fund luxury but utility, any price caps for the bonus could be tied to vehicle range, but should also ensure no taxpayers money does is spent on optional luxury extras like leather seats etc. Range is not luxury. Long-range ZEVs are necessary to fully replace a fossil-fueled vehicle, rather than stimulate second car purchases. The price cap could be redefined to depend on range, but to also be based on the real purchase price of the vehicle, not the list price of the base model.

Longer-range vehicles are more expensive by necessity, due to the size of the battery, the most expensive component of a vehicle; they are also more likely to be displacing ICE miles fully.

Evidence from Norway from the Norwegian EV owners association<sup>29</sup> shows that the while the average EV replaces 100% of ICE miles driven 30% of the time, a long-range EV (Tesla vehicle being the proxy for this) fully replaces ICE miles driven 70% of the time (Annex 1).

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<sup>28</sup> Based on SMMT figure of sales to end of July 2021 – total car sales of 1,003,269 with 85,032 BEV sales that would be eligible for the grant. - <https://www.smmt.co.uk/vehicle-data/car-registrations/>

<sup>29</sup> See Annex 1 - Norway owners EV association owners poll data – tesla – more used in single car family

In addition to range, efficiency of a vehicle and setting a minimum requirement (in miles/kWh), could also be considered. Including the metric will create a focus on efficiency as it has done for ICE vehicles; the equivalent of miles per gallon.

Table 1 provides examples of the *average* levy required to fund a ZEV grant at different levels of market share and continuing with the current grant amount of £2,500. It assumes that the 2.3 million new cars are sold each year in the UK car market<sup>30</sup>. Year to date the UK is at approximately 8% market share<sup>31</sup>

| ZEV market share | Total new cars | New ZEVs | New ICEVs | Grant level (£) | Total Grant pot (£) | Levy to fund Grant (£) |
|------------------|----------------|----------|-----------|-----------------|---------------------|------------------------|
| 10%              | 2,300,000      | 250,000  | 2,250,000 | 2500            | 625,000,000         | 278                    |
| 20%              | 2,300,000      | 500,000  | 2,000,000 | 2500            | 1,250,000,000       | 625                    |
| 30%              | 2,300,000      | 690,000  | 1,610,000 | 2500            | 1,725,000,000       | 1,071                  |

Table 1 – indicative bonus-malus calculation to fund a current ZEV grant of £2,500

The level of taxation in table 1 is clearly not representative of the damage that ICE vehicles cause to society from both a climate and air quality perspective. However, this tax would at least help to fund accelerated uptake of ZEVs, by reducing the gap in price between ICE and EV, without a draw on the public finances.

Government could also consider increasing the levy level above the required equilibrium point (see Figure 2). This would create a slightly higher than required levy on new fossil-fuelled vehicles today, which would build up a pot to fund a grant going forward. The rationale for this is that purchasers of new fossil-fuelled vehicles should contribute somewhat to the damage that they will cause.

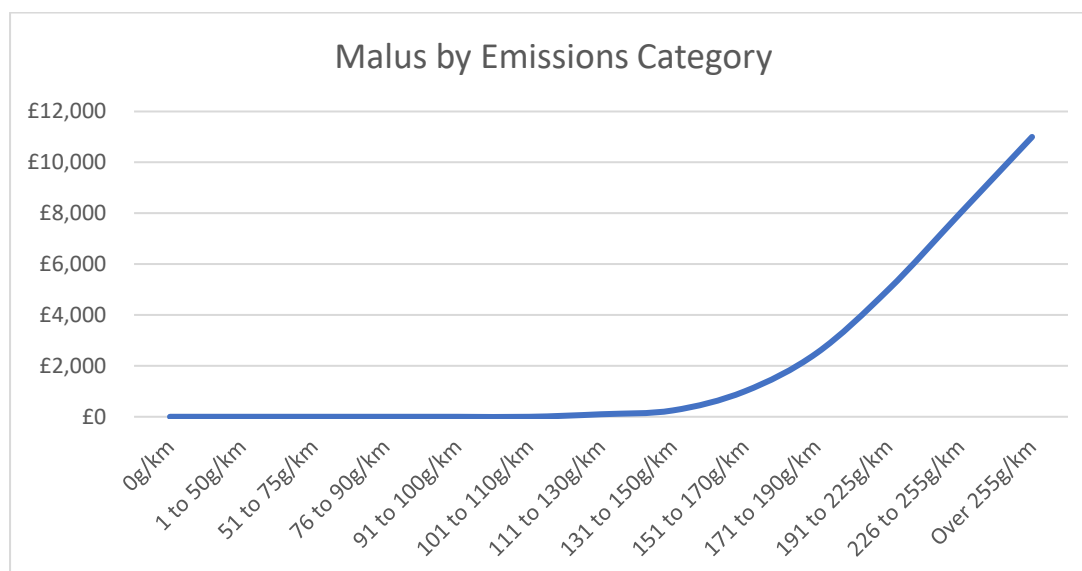


Figure 2: Example of a malus level by CO<sub>2</sub> emissions category used for VED – this malus level could fund a £3,000 bonus of ZEVs with ease and provide a surplus of funding for later years. The malus is designed to avoid impacts on lower income groups which tend to purchase smaller vehicles with relatively low CO<sub>2</sub> emissions.

<sup>30</sup> SMMT estimates 2.29m sales per year on average between 2023 and 2027 in their [central scenario](#)

<sup>31</sup> SMMT figures for [July YTD](#)

The Government should use the forthcoming Spending Review to explore the level at which a levy and grant should be set for future years to fund a serious shift from fossil-fueled road transport to sustainable road transport. Countries such as France have successfully used this system to incentivize consumers to choose ZEVs and disincentivize the most polluting vehicles.

ZEVs in all parts of the car market should be supported as all are contributing to replacing fossil-fuelled miles driven; however range should be the eligibility factor rather than price, although we do propose a price cap linked to range that could be useful, as below. A cap linked to range would be a much more effective policy<sup>32</sup>.

A range-neutral cap can be introduced via the application of a simple formula. The effect is to ensure that an increasing range is required of EVs to benefit from the grant as the price of cars increase. Any cap must also be the total price of the vehicle including optional extras. A cap which excludes options invites the opportunity to optimize the base price to below the cap and add Options that then take the ultimate price of the vehicles above the set price cap.

We would suggest a formula: Price cap level = £10k + (WLTP range x £150) to determine the price cap cut off point, where no grant would be received for that range level. This is based on an analysis of the EV market looking at the average range versus cost of vehicles to give you a cost per mile.

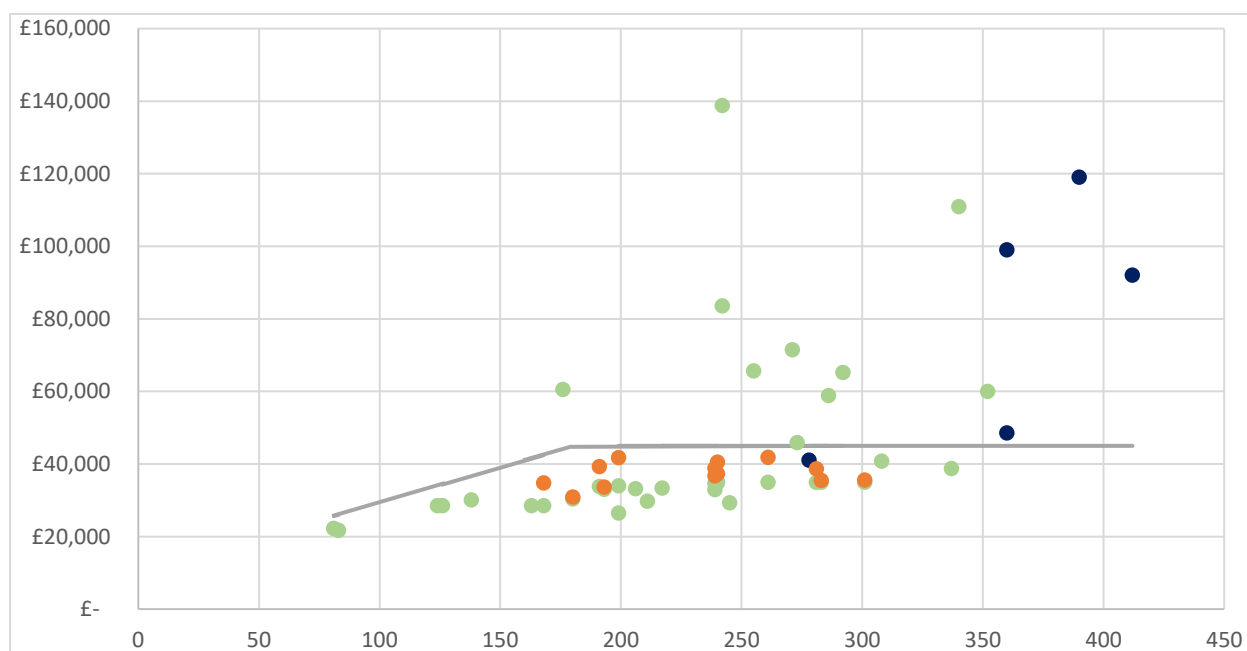


Figure 3: A formula-based range led price cap for a bonus malus scheme (grey line – capped at £45,000). The blue data is the entry level vehicle model, orange data are models where “extras” are available creating a far higher overall price. Price caps must be based on the price paid including optional extras.

<sup>32</sup> Note that the price cap associated with the current plug in car grant is set at £35,000 – the rules allows chargeable options to be added to vehicles. Even if the final price over £35,000 the vehicle remains eligible for the grant.