

Funding purchase grants for zero emission cars in a growing UK market

A UK bonus-malus scheme

November 2019

Summary

Electric cars are a key technology for decarbonising vehicles and UK sales have been growing steadily year on year. In 2018, there were 15,500 sales of battery electric vehicles (BEVs) in the UK which is expected to at least double in each year to 2021 by which time around 125,000 BEVs will be sold. The increase in sales arising from the need for manufacturers to meet regulatory targets to lower new car CO2 emissions and avoid high penalties and the significant reputational risks of failing to comply. To ensure targets will be met carmakers are launching large numbers of new BEVs and PHEVs and investing in significant new production capacity.

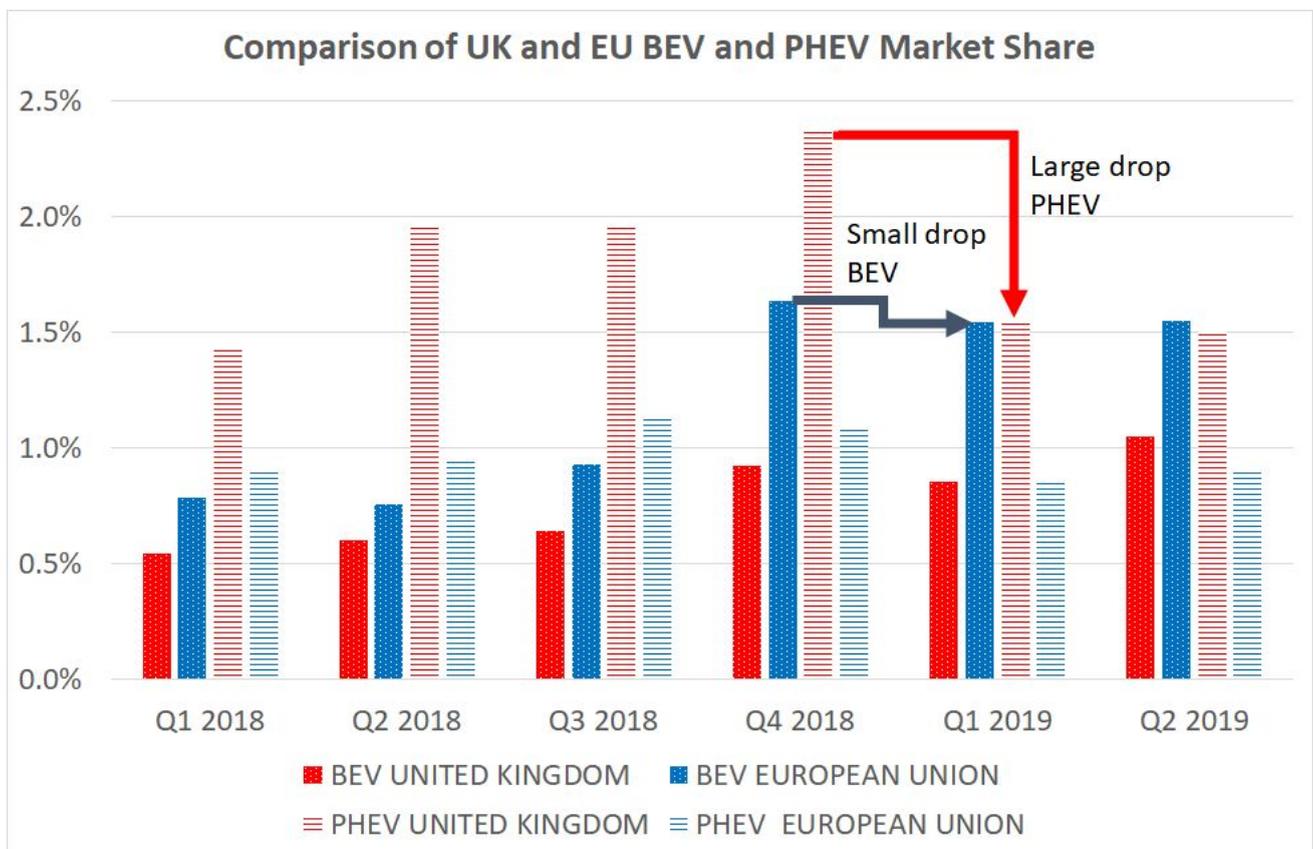
To encourage the shift to ultra low and zero emission vehicles the UK has provided plug-in grants to support their higher purchase price. The scheme was introduced in 2011 and is currently scheduled to end in March 2020. The ending of grants for PHEVs in 2018 (following concerns they were not charged regularly or used in electric mode) caused a significant weakening in their sales that dropped from 2.4% of new car sales in Q4 2018 to 1.5% in Q1 2019. The cutting of the grant for BEVs by £1,000 to £3,500 also temporarily caused a small drop in sales of these models. It is therefore clear that if grants are discontinued in 2020 this is likely to create a significant market disruption at the moment carmakers need to sell these vehicles to meet targets and avoid fines.

The rise in sales of BEVs is making the plug-in cars grants prohibitively expensive for the Treasury. Assuming the grant is retained at its current level the cost of the scheme is estimated to rise significantly from £115 - 133 million in 2019 to £175 - 306 million in 2020; £350 - 613 million in 2021; and £885 - 1600 million in 2025. To maintain the affordability of the plug-in grants it is proposed to fund these through a registration tax on new cars with engines (replacing the first year VED tax). With the proposed scheme: ZEVs would continue to receive a grant of £3,500; PHEV would not be taxed or receive a purchase grant; registration of cars with engines would incur a tax that would rise according to the CO2 emissions of the vehicle. The minimum initial tax would be £250 and maximum tax £2000. Each of these criteria could be adjusted over time. Such registration taxes would increase the incentive to shift to a ZEV and send a clear message to car buyers that if they choose zero emission The Government will help them; but the more polluting car the more tax they will pay. Such simple messages can incentivise and nudge new car buyers more effectively than the current arrangements. The scheme is modelled on the French [Bonus-Malus](#) tax that has successfully operated since 2008. The costs and revenues of such a tax scheme have been estimated and overall the scheme would generate higher revenues than the current 1st Year VED but are not so high as to significantly lower overall sales of new cars. The additional revenues earned could also be used to support charging infrastructure and electricity grid upgrades.

1. Introduction

Since 2011, purchase grants have been an intrinsic part of the UK incentives to encourage the switch to electric vehicles (EV's) including, originally, both battery electric (BEVs) and plug-in hybrid models (PHEVs). Sales of around [250 thousand cars](#)¹ have now been supported through grants helping to drive a strong increase in uptake each year. Originally launched as a grant for electric cars capped at £5,000 the scheme has evolved over time to include vans, trucks and hydrogen fuel cell vehicles. The eligibility criteria for cars have been regularly amended with the value of the car grant progressively lowered as sales have grown.

The most recent change to the plug-in car grant was in October 2018 which ended grants for PHEVs with emissions below 50g/km and cut the maximum grant for BEVs from £4,500 to £3,500 provoking a considerable backlash from the auto-industry, in the media and car buyers. PHEV grants for £2,500 had previously been available but strong sales (44,437 PHEVs were sold in 2018) resulted in the cost of the PHEV grants to grow to over £100 million per year. In contrast the grants for BEVs cost around £70 million. The decision to focus support on encouraging the switch to BEVs was reasonable particularly as there was also [growing evidence](#) PHEVs were not delivering their intended benefit as owners do not frequently charge these cars. However, the changes to the plug-in grant not only caused a sharp and permanent reduction in sales of PHEVs from 2.4% to 1.5% market share it also resulted in sales of BEVs to temporarily stagnate whereas they had been growing strongly. The overall impact was therefore a temporary decline in overall sales of EVs (BEV plus PHEV) and a loss in market confidence as illustrated below.



Note: grants for PHEVs ceased at the end of 2018

The case-study illustrates the sensitivity of the emerging EV market to changes in support (as has been observed in other markets such as the Netherlands) and serves as a warning that if grants for BEVs end in March 2020 the Government will seriously undermine sales of BEVs and progress decarbonising cars just

¹ Assumes sales continue to rise from the 2nd quarter of 2018

as [many new models](#) are coming to market. The figure also illustrates whilst PHEV sales remain above the EU average; those of BEVs are lower than the EU average. Weakening incentives will therefore make it impossible to achieve the stated aim of being a leader in the shift to EVs.

However, as sales of battery electric vehicles grow purchase grants become increasingly unaffordable. This paper examines the likely cost of continuing the current system of grants and proposes an alternative approach, similar to the French bonus-malus registration (purchase) tax, that integrates first year Vehicle Excise Duty (VED) with the grant and which provides a means to support sales of zero emission vehicles for the next few years until they can compete fully with engined cars.

2. Current and future sales of BEVs 2020-5

Year to date, sales of battery electric vehicles in the UK have reached [1.4% of new sales](#) up from 0.7% in 2018 when around 15,500 cars were sold. So far in 2019 over 25,000 BEVs have been sold with October sales of BEVs achieving a 2.2% market share. Sales are likely to exceed 35,000 in 2019 more than double those in 2018. The rise in sales comes with a cost for the Treasury that in addition to losing fuel duty and VED revenue is also paying a £3,500 grant for each BEV sold at a cost of around £125 million in 2019 (calendar year).

2.1 Anticipated EU sales

The rise in BEV sales is expected to accelerate in 2020 and 2021 as new EU car CO₂ regulations come into force. Each carmaker has a target to reach for the average CO₂ emissions from new cars it sells. Overall the industry must achieve average emissions of 95g/km in 2020 for 95% of the cars sold (the highest 5% of emitters are excluded). In 2021, the industry must achieve the same target but all cars sold count towards the target. Failing to achieve the target results in penalties of €95/g/km/vehicle that for some carmakers could amount to €1 billion per annum plus huge reputational damage. Selling BEVs and PHEVs is one the principal compliance pathways for carmakers that are scaling up [production](#) and marketing to ensure they comply with targets. Detailed analysis by T&E shows the car industry is [estimated](#) to sell 3.1% BEVs and 2.5% PHEVs EU-wide in 2020 to achieve targets rising to 6.4% BEV and 6.1% PHEV in 2021. Individual manufacturers must sell widely differing levels of plug-in cars and planned production is sufficient to meet these goals. However, higher levels of sales than this are not anticipated as the objective of the carmakers, at present, is only to comply with the regulation.

2.2 Anticipated UK sales 2020 and 2021

Predicting the size of the future UK market for BEVs is uncertain because of Brexit. If the UK leaves the EU with transitional arrangement the BEVs and PHEVs sold in the UK will count towards European targets during any transitional period and possibly beyond this. UK sales of BEVs are historically slightly below the EU average and despite the recent growth in UK, BEV sales levels in the EU as a whole have been rising even faster.² The decision to zero rate company car tax in 2020/1 and apply just a 1% rate in 2021/2 will boost UK sales and assuming grants continue in some form it is reasonable to assume if the UK remains part of the EU car CO₂ regulation UK sales of BEVs will continue to be similar to EU average values or slightly less.

In the event of a no deal Brexit equivalent UK regulations to the EU car CO₂ regulation should ensure carmakers still supply zero and low carbon models to the UK. The make-up of the UK market for new cars is slightly different from the EU market in respect of the proportion of the market share of different manufacturers. On average companies selling more cars in the UK are also those expected to sell slightly more BEVs to achieve their targets. To avoid fines for the UK scheme the market share of BEVs in the UK is estimated to be 3.2% in 2020 and 6.7% in 2021. The imposition of 10% tariffs on imported vehicles and the

² In the second quarter of 2019 UK BEV sales represented 1.1% of total car sales compared to 1.5% as an EU average. The most recent UK data from September showed BEV sales had jumped to 2.2% in the UK but average EU sales were 3.2%.

weak pound may suppress supply whilst a possible recession will constrain demand for new cars overall making forecasts of absolute sales particularly uncertain in this scenario.

2.4 Anticipated UK sales 2025

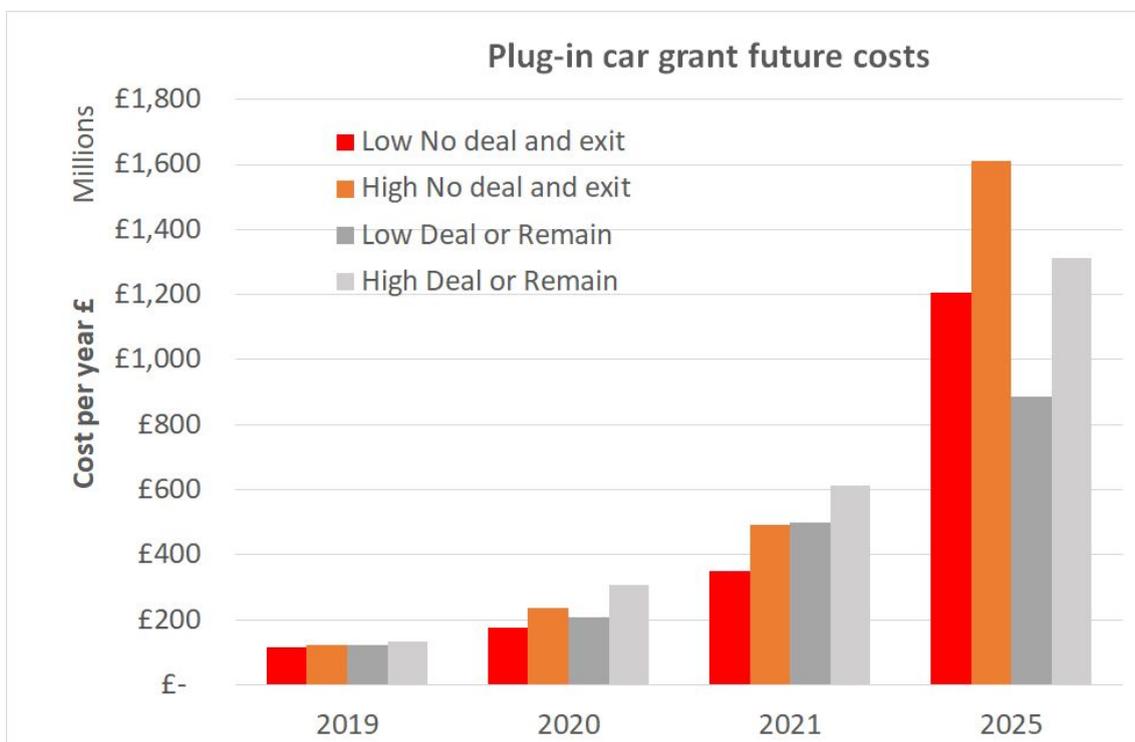
The EU has now adopted regulations for new car CO2 emissions in 2025 and 2030 with emissions reductions of -15% and -37% for new cars from 2021 respectively. These regulations come into force before the UK leaves the EU so could also apply here depending upon the outcome of post Brexit negotiations). To meet the EU -15% 2025 target, sales of BEVs are estimated to rise to about 13% and those of PHEVs about 10%.³

However, since the UK may have left the EU the UK could also set its own targets that are more appropriate for its national policy. Current [UK policy](#) is to achieve 50-70% ultra-low emission vehicles by 2030. Assuming an equal share of BEV and PHEV this will require sales of BEVs of around 25-35% by 2030. To be on track to achieve the current goal the UK will therefore need to be selling at least the same number of BEVs as the EU average by 2025 and probably slightly more, between 15-20%.

Recently the UK committed to achieving net zero by 2050 and the Climate Change Committee has [recommended](#) an end to sales of all vehicles with engines by 2035 at the latest - in effect 100% zero emission vehicles by this date. Such a goal would require a more aggressive trajectory with sales of ZEVs to be around two-thirds of new vehicles by 2030 and around one-third by 2025 - considerably more than required to achieve EU targets.

2.5 Cost ranges

The graph below shows the estimated cost of grants for BEVs (or ZEVs) in 2019, 2020, 2021 and 2025 based upon a range of scenarios assuming the existing grant is maintained at £3,500. The 2025 cost assumes current policy (not bringing forward the end date for sales of conventional cars). The table in the Annex shows the assumptions on which estimates of the costs of future grants are based including likely ranges of market share and estimated total number of BEVs sold.



³ Assumes average emissions from ICE vehicles drop from 105 to 100g/km 2021 to 2025 and PHEV market is three-quarter that of BEVs.

The ranges of costs are relatively wide reflecting the uncertainty of the Brexit process and future market but illustrate that the costs will rise significantly in coming years:

- £115 - 133 million in 2019
- £175 - 306 million in 2020
- £350 - 613 million in 2021
- £885- 1600 million in 2025.⁴

By 2021, the cost (assuming the current £3,500 grant is retained) will be between one-third to two-thirds of a billion pounds a year. By 2025 such a grant is unlikely to be necessary to support sales but the cost would approach £1 to 1.5 billion per year to meet the current Road to Zero targets. A more ambitious target to end sales of cars with engines by 2035 would incur costs of over £2.5 billion per year. Whilst cutting the grant will clearly reduce costs it will also lower sales, slowing down decarbonisation of passenger cars and making it harder to achieve policy goals. A grant in 2025 of £1000 would still lead to costs of £250 - 375 million, a substantial increase compared to historic levels.

3. Funding grants through taxes on cars with engines

Purchase grants could be funded through the reform of registration taxes in the UK such that all new cars with engines (including hybrids, diesel, petrol and natural gas) pay a fee using an approach similar to the French [Bonus-Malus](#) scheme. In the proposed UK scheme a registration tax would be applied to all new cars such that:

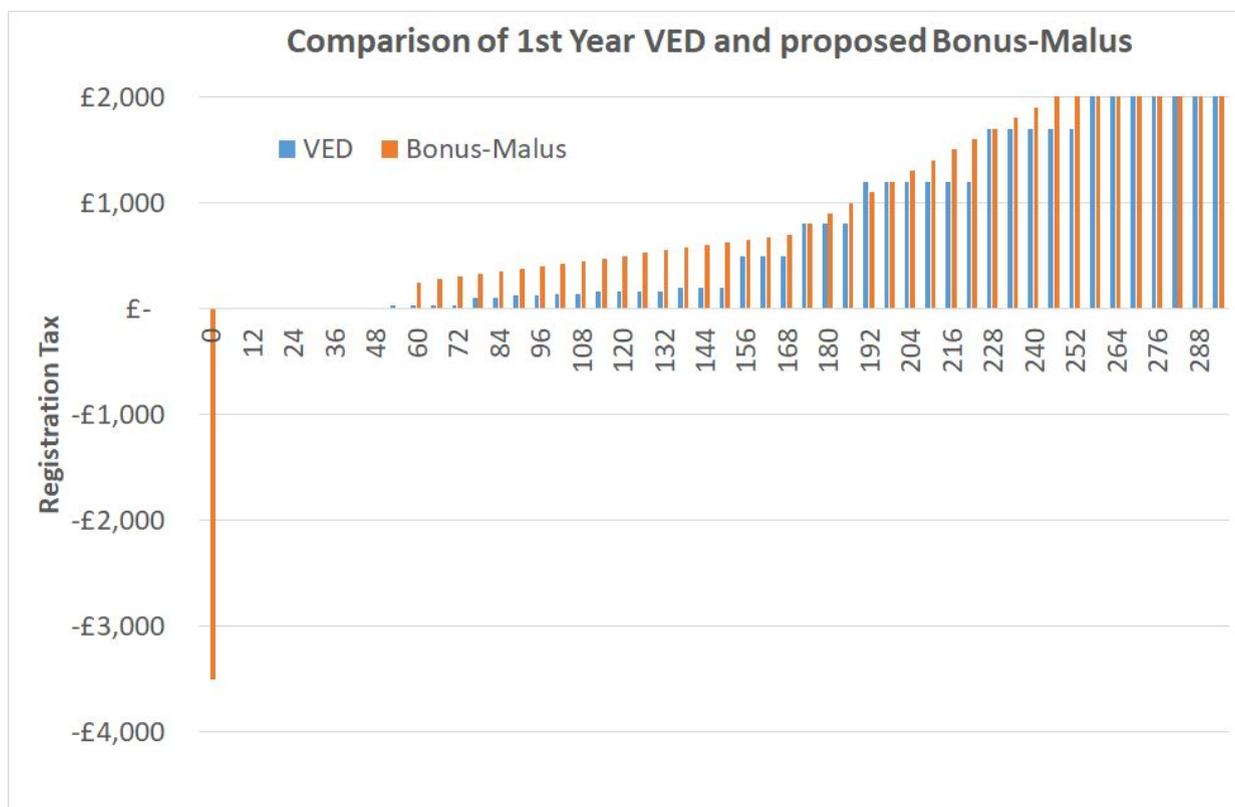
- ZEVs would continue to receive a grant of £3,500.
- PHEV would not be taxed or receive any purchase grant.
- Registration of cars with engines would incur a tax that would rise according to the CO2 emissions of the vehicle. It is proposed that the minimum tax would be £250 and maximum tax £2000 (the current ceiling for 1st year VED).

The proposed grant/tax would be designed to tax all cars with engines. To do so in a technology neutral manner the purchase tax would begin on cars with emissions above 60g CO₂/km (WLTP). This would enable all PHEV models to receive no tax (or grant) and future proof the standard to ensure future hybrid models (that utilise an engine) pay a small tax.⁵ If necessary the threshold could be amended in the future along with other details of the grant/tax.

The grant/tax would replace the current first year VED tax on vehicles. The tax levied would be slightly lower for PHEV cars (emissions 1-59g/km); slightly higher for cars with engines between (60 - 170 g/km) and broadly similar for cars with higher emissions over 170g/km. The current system of 1st Year VED provides minimal incentive to choose zero or lower carbon models and the proposed approach slightly increases this incentive but provides a clear signal choosing electric is not only the green option but tax efficient too. The level of taxes proposed should not create a significant political backlash. Future revisions of the price signal to increase the differential between a grant for a ZEV and tax on an engined car could help to drive the market faster, for example if the UK adopted more ambitious 2025 targets than the EU has done. An illustration of the proposed CO₂ bands, which are based upon the WLTP values, are detailed in the figure overpage.

⁴ Based upon achieving the current Road to Zero Strategy

⁵ The lowest emission conventional hybrid vehicle is currently the Toyota Prius (75g/km).



T&E has estimated the costs and revenues of the grant/tax using as a starting point the UK CO2 new cars distribution of sales by CO2 emissions (shown in the Annex). To forecast costs of grants and revenues in T&E then adjusted the distribution of the anticipated increase in BEV and PHEV vehicles likely to be sold in future years and assumed some improvements in the CO2 emissions from conventional cars. The scheme generates a surplus in each year but the grant would need to be reduced (to £1000 by 2025) to remain cost neutral as BEV sales increase sharply.

Million	2020	2021	2025 (£3500)	2025 (£1000)
BEV total grant	-£ 263	-£ 525	-£ 1,531	-£ 438
ICE total tax	£1,436	£1,282	£ 886	£ 886
Tax revenue - grants paid	£ 1,174	£ 757	-£ 646	£ 449
Estimated 1st year VED revenues	£ 734	£ 620	£ 403	£ 403

Costs and revenues from the proposed grant/tax and first year VED schemes

The overall costs of the registration grant/tax are positive in 2020 and 2021 providing an income to invest in charging infrastructure and grid upgrades and the total tax income from the registration taxes are greater than for the equivalent first year VED scheme. There are numerous ways the scheme could be revised or amended - which could include:

1. Requiring a tax, or providing a grant for PHEVs - and linking this to the CO2 emissions of the PHEV or minimum electric range
2. Starting the penalty at the level of best performing HEVs
3. Raising the tax to drive a faster uptake of EVs

4. Raising the value of the grant to eliminate the surplus and create a fiscally neutral scheme.

4. Final comments

If the UK wishes to be a leader in the manufacture of electric vehicles it also needs to be a leader in sales. At present sales of electric vehicles overall in the UK are around the EU average level and sales of zero emission vehicles (mainly BEVs) are weak compared to competitors. In coming years there is an opportunity for the UK to grow sales and with this become a more attractive location to manufacture vehicles also but to do so it needs to make EVs more attractive to buy. The market share of electric vehicles is very sensitive to grants and tax schemes and previous cuts to grants in 2018 caused a significant slump in the market for PHEVs. The current grants to help purchase zero emission vehicles of £3,500 are due to end in March 2020 and if these suddenly stop it will significantly impact on demand and market confidence just as manufacturers need to sell vehicles to achieve regulatory targets and avoid onerous penalties. To achieve its CO2 targets the grants need to continue - but as sales grow so the grants become increasingly unaffordable. The fairest way to fund grants is for the costs to be met by other buyers of new cars that have chosen a vehicle with an engine and thus create more CO2 and air pollution. This type of scheme has operated successfully in France since 2008 and should now be adopted, in a modified form, in the UK.

There are other ways to incentivise sales of zero emission vehicles such as imposing lower rates of VAT or paying for grants from public spending. But VAT reductions are regressive and there are many demands on public funding. The proposed scheme in which the purchase of zero emission vehicles receives a grant; buying an ultra-low emission model (PHEV) receives neither a grant nor pays a tax; and sales of cars with engines are taxed more as the emissions increase is a transparent and fair way to incentive the shift to zero emission vehicles and easily communicated and understood.

The UK has a first year registration tax, but for all but the highest emitting vehicles the tax imposed is minimal and gives no meaningful incentive to choose a ZEV. The proposed registration grant/tax increases the incentive and raises more tax than the current 1st Year VED approach. By linking the grant and the registration tax in a single scheme the message to the car buyer is simple - chose zero emission and the Government will help you; the more polluting the new car you choose the more tax you will pay. Such simple messages can have impacts beyond their monetary value nudging the car buyer in the direction of zero emissions vehicles and helping make the UK a leading market and therefore more attractive place to manufacture the cars.

Further information

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Annex: Key assumptions

Year		2019	2019	2020	2020	2021	2021	2025	2025
Scenario		Low	High	Low	High	Low	High	Low	High
No deal and exit	% BEV	1.5%	1.6%	2.5%	3.2%	5.0%	6.7%	15.0%	20.0%
	Total sales (million)	2.2	2.2	2.0	2.1	2.0	2.1	2.3	2.3
	Total BEV	33,000	35,200	50,000	67,200	100,000	140,700	345,000	460,000
	Cost (£ million)	£ 115.5	£123.2	£175	£235.2	£350	£492.4	£1,207	£1,610
Deal or no exit	% BEV	1.5%	1.6%	2.5%	3.5%	6.0%	7.0%	11.0%	15.0%
	Total sales (million)	2.37	2.37	2.37	2.5	2.37	2,5	2.5	2.5
	Total BEV	35,550	37,920	59,250	87,500	142,200	175,000	253,000	345,000
	Cost (£ million)	£124.4	£132.7	£207.3	£306.2	£497.7	£612.5	£885.5	£1,312

