



AUTOMOTIVE
FROM ULTIMAMEDIA

Climate Change vs Carmakers

European Commission CO2 Targets,
US CAFE Standards & Chinese
CAFC Regulations



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1.0 Executive Summary

Global automakers face a sharply tightening regulatory climate over the next decade, initially impacting the EU with multi-billion euro fines over the next few years, seriously impacting profitability and potentially putting into question the entire financial viability of some OEMs.

To demonstrate the profound gravity of the problem, given current emissions levels in the EU, if they do nothing to comply with emission targets, OEMs selling into the EU market will collectively be facing combined annual fines of €25bn per year – which is equal to the OEMs' current profits in the EU market – and would effectively wipe out operating margins.

Therefore, OEMs are going to be forced to act, and to act drastically. Our analysis indicates that the OEMs are likely to reach *most* of the way to their targets, but still fall some way short.

Ultima Media Predicts That Automotive OEMs Selling Into The EU Market Are Set For Combined Fines Of €2bn In 2020 Rising To €5bn In 2021 For Breaching European CO2 Emissions Targets

The fines will heavily impact the bottom lines of OEMs, with severe consequences during an already difficult period for the automotive industry. The global backdrop to all of this is a slowing economy and trade wars leading to declining sales which is already undermining the economic viability of OEMs' current business models.

This also comes during a critical transitional period for the industry when OEMs are being expected to invest in expensive new low emission and electric vehicle technologies to achieve those lower emissions targets. This irony is not lost on the automotive industry, whose top executives have bitterly complained to regulators that the fines are counter-productive and directly undermine the OEMs' ability to invest in the new technologies required to reduce emissions.

The result of this clash between carmakers and governments wanting to mitigate climate change will be a fundamental restructuring of the industry, with a knock on effect upon Tier 1 and Tier 2 suppliers and further down the supply chain, which will be under intense pressure from OEMs to help them deliver the advanced technologies necessary to reduce emissions.

This report is the latest in Ultima Media's forthcoming series of articles which will highlight the pressing industry issues and the resulting new business growth opportunities which will emerge from this.

2.0 Global Push To Reduce CO2 Emissions

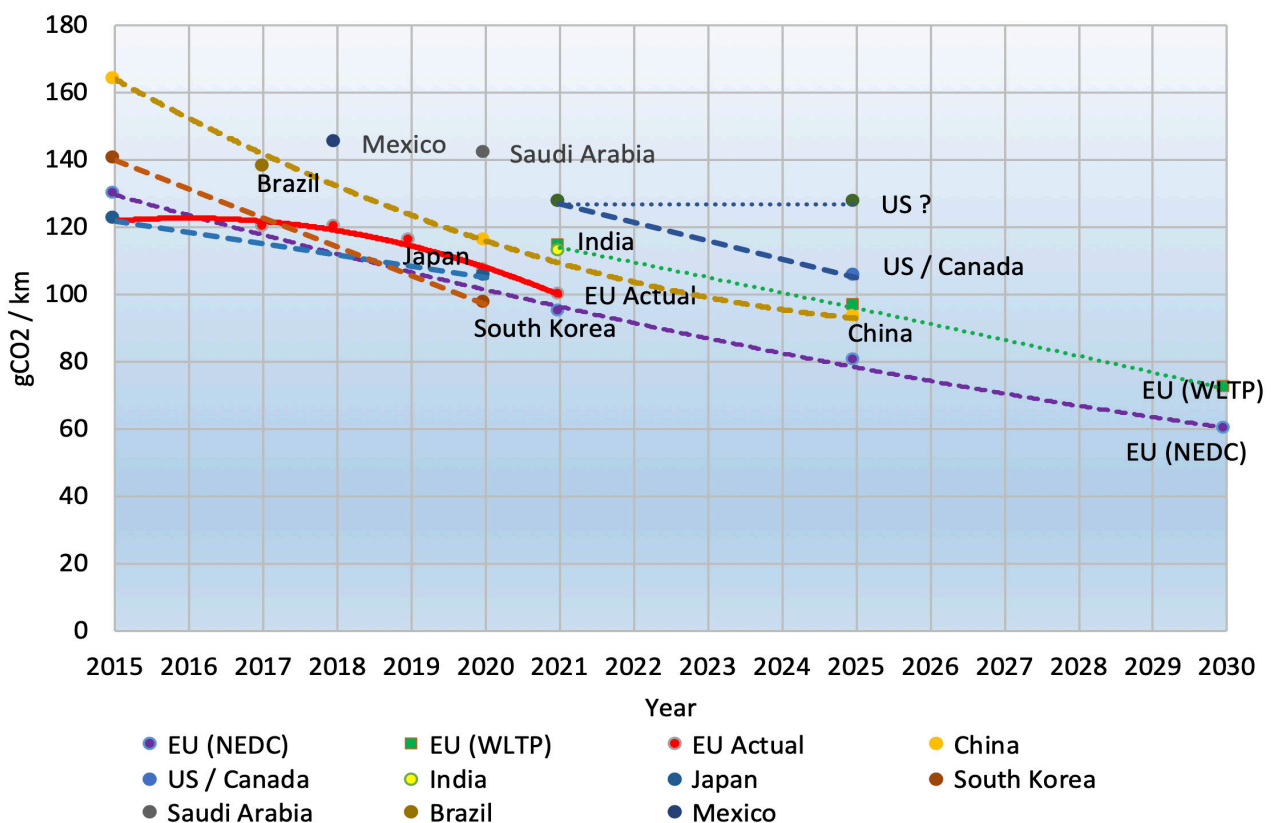
Global climate change has compelled regulators around the world to target car use as a prime source of CO2 emissions.

Over the coming few years, OEMs face punitive fines for breaching increasingly stringent regulatory targets. These fines will heavily impact profitability, influence business models, affect new car development cycles, inform powertrain choices and, ultimately, the entire outlook for the automotive industry.

2.1 Regulatory Divergence in Emission Regulations

Although there is a global push to limit CO2 emissions from vehicles, there is regulatory divergence in emissions regulations within different regions. See Figure 1 where the US / Canada targets are significantly more lenient than the Chinese or EU targets. This is a risk for the OEMs as the investment to develop low emissions technology is being primarily led by the EU market, which has the strictest emissions regime – hence the emphasis on the EU regulatory regime within this analysis.

Figure 1 Regional Passenger Vehicle Fleet Average CO2 Emissions Targets 2015-2030 (g CO2/km)



Source: Automotive from Ultima Media 2019

Note:
*NEDC refers to the New European Driving Cycle which was designed to measure the emission levels of car engines and fuel economy in passenger cars (excluding light trucks and commercial vehicles). However, it was deemed that the test procedure had become increasingly unrepresentative of modern driving styles.
Its successor is the WLTP, which refers to the Worldwide Harmonised Light Vehicle Test Procedure and was phased in from 2017 to 2019. However, future NEDC targets for 2025 and 2030 will be converted back to WLTP – hence the continued inclusion of NEDC in the graph until 2030. The WLTP is also intended to harmonize global test standards on an international level. One of the main objectives of the WLTP was to more closely match the laboratory test conditions with real-world driving conditions.

2.2 Automotive Headwinds Making It Harder To Reach CO2 Emissions Targets

However, to make matters worse for OEMs, there are some trends that are actually pushing average fleet CO2 emissions in the wrong direction, and in the most part it is caused by the OEM's own actions.

2.3 Decline In Diesel

Due to 'dieselgate', governments have reversed earlier policies to encourage diesels, which had been promoted as more fuel efficient engines as they emit less CO2. Due to more recent evidence of the damage of particulate emissions from diesels, regional and national governments have reversed this policy and are now taxing and penalising diesels more, resulting in a steep decline in sales and a higher share of petrol vehicles in the product mix, which emit more CO2. To illustrate this trend, within the EU, diesel vehicle sales peaked at 56% in 2011 but fell to 44% in 2017 and to 36% in 2018. Early indications for 2019 indicate a continued downward trajectory for diesel as in Q2 of 2019 diesel accounted for just 31.3% of sales.

2.4 Growing SUV Trend

There is a consumer trend towards larger SUVs and crossovers, which emit more CO2 as they are taller, heavier and less aerodynamic. VW and Ford, for example, are openly pushing their SUV range to improve profitability, as these larger vehicles tend to have higher margins. These higher margins per vehicle have helped VW to maintain profitability despite falling volumes. The increasing proportion of SUVs in the product mix does, however, push up the overall CO2 fleet average for OEMs. This short term pursuit of profits is understandable, but it has created a self-imposed headwind.

2.5 Vehicles Are Getting Heavier

The average weight of new cars in the EU increased by 124kg from 2000 to 2016 and has increased average emissions by an estimated 10g CO2/km. This extra weight is due to increasingly standard features, e.g. air conditioning and electric windows, and rising safety expectations to achieve higher European New Car Assessment Programme (Euro NCAP) safety ratings, inevitably adding more crash protection and more weight.

3.0 European CO2 Emissions Targets

3.1 How The Targets Work

In Europe, regulators are requiring automotive OEMs to reduce CO2 emissions of their 'fleet average' emissions to meet the overall EU fleet target in 2020 and 2021 of 95g CO2/km (NEDC test cycle) for passenger vehicles. The targets will be phased in for 2020, when the 'best' 95% of an OEM's fleet will be used to calculate emissions. From 2021, 100% of vehicles will be used in the calculation. In parallel, the target for light-commercial vehicles (LCV) is 147g CO2/km in 2020 and 2021.

However, each OEM manufacturer group gets their own individual target depending on the 'utility' i.e. the average mass of the vehicle fleet they sell within the EU in that year. This is calculated using a 'limit value curve'. As volume OEMs such as Fiat Chrysler Automobiles (FCA) predominantly sell smaller, lighter vehicles, their fleet average target is slightly lower at 91g CO2/ km. Conversely, for BMW, a premium OEM that generally sells larger heavier cars, a target of 101g CO2/ km will apply. See Table 1.

OEMs who do not reach their individual targets will be fined €95 (\$106) for each 1g CO2/km over their target multiplied by their entire EU sales volume. As can be seen from Table 1, in 2015 OEMs actually undershot the overall target. However, for 2020 and 2021, our forecast indicates that OEMs will miss the overall EU target by around 5g CO2/km incurring considerable fines. See Figure 1.

3.2 Super Credits & Exemptions

'Super credits' are incentives within the regulations to encourage OEMs to sell zero and ultra-low-emission cars emitting less than 50g CO2/km, such as fully battery electric vehicles and some PHEVs. These vehicles then count as: 2 vehicles in 2020, 1.67 vehicles in 2021 and 1.33 vehicles in 2022. A cap on the super-credits is set at 7.5 g CO2/km per OEM over the three years.

It's worth making a special mention about PHEVs such as the Mitsubishi Outlander, which currently achieves 46g CO2/km when tested on the NEDC test cycle, and so just qualifies as an ultra-low emission vehicle (ULEZ). But under the new WLTP test cycle, which relies less on the battery powered mode, the Mitsubishi Outlander will measure above the crucial 50g CO2/km threshold to qualify as an ULEZ. This is creating a headache for OEMs as this crucial threshold will determine the viability of many of these PHEV models given the subsidies in many countries (and entry into ULEZ zones in some cities) that the ULEZ category allows. However, modifying PHEVs with larger batteries to get under the 50g CO2/km threshold has cost implications, especially given the relatively small sales volumes of PHEVs.

And for OEMs with fewer than 300,000 passenger cars registered in the EU in a given year, there are various exemptions and derogations. However, this derogation will be phased out by 2028. This of course will have a profound effect upon smaller niche automakers who are currently exempt from the regulations, but in future the only option they may have will be an acquisition with a larger OEM group who can absorb a relatively small number of higher emitting vehicles (as VW Group does with Porsche).

3.3 Forecast Of Fines Impacting The OEMs

The calculation for OEM fleet average emissions (and targets) will be based upon vehicles actually sold and registered, and not just vehicles manufactured. Therefore, there are many unknowns. The precise product mix two years ahead is dependent upon what customers actually buy, government purchase subsidies, tax incentives, OEMs pricing and marketing strategy, as well as any potential CO2 pooling deals between OEMs. Nonetheless, Table 1 illustrates our assessment of each OEM and the likely fines they will face.

Table 1 Major OEMs EU Fleet CO2 Emissions Forecast 2017-2021 (g CO2/km) (NEDC) And Likely EU Fines in 2020 & 2021

OEM Group	OEM EU Fleet g CO2 / km Forecast					EU Fleet g CO2 / km Target*		EU Sales (million)	Fines (€)	
	2017	2018	2019	2020 *fines on 95%	2021	2020 *fines on 95%	2021	2018	2020	2021
BMW	122	127	120	114	105	101	101	0.99	€143m	€376m
Daimler	127	132	125	116	106	102	102	0.94	€214m	€357m
FCA - Tesla	118	122	113	100/ 91*	96/ 91*	91	91	0.99	€900m *	€900m *
Ford	121	122	115	108	99	96	96	0.93	€108m	€265m
Honda	127	127	120	108	96	97	97	0.12 (exempt)	OK	€0
Hyundai-Kia	122	123	113	105	96	93	93	0.92	€131m	€262m
JLR	151.4	155	147	140	130	130	130	0.23 (exempt)	OK	€0
PSA	112	114	110	103	96	92	92	2.34	€155m	€889m
Renault - Nissan - Mitsubishi	112	113	106	100	92	93	93	2.02	OK	€0
Toyota - Mazda -	110	110	105	98	92	94	94	0.85	OK	€0
Volvo	124	130	120	114	104	106	106	0.35	OK	€0
VW Group	122	123	116	108	102	96	96	3.30	€376m	€1,881m
Total	120	120.5	116	107	100	95	95	15.6	€2,027m	€4,930m

Source: Automotive from Ultima Media 2019

FCA warrants a special mention because it has stated that it “expects to be compliant”. But rather than achieve this through achieving lower emissions for its fleet, it plans to reach CO2 targets by paying Tesla €1.8bn (\$2bn) in a CO2 ‘pooling’ deal for 2020 and 2021. In 2020, it is expected around 80% of FCA’s CO2 compliance would be from the pooling deal, which will reduce to 15% in 2021 as FCA’s more efficient internal combustion engines, new hybrid electric and electric vehicles come on stream. For 2022 and beyond, FCA has stated that it intends to be compliant without any pooling deal with Tesla.

Nonetheless, all OEMs will have to apply varying degrees of hybrid and EV offerings to bring their fleet average emissions down. FCA will still have to invest a lot in compliance costs and has stated that it will spend €120m in 2019 in Europe alone. Globally, FCA executives have forecasted that compliance costs will be “moderately higher” than the €600m FCA spent in 2018. Toyota, on the other hand, is well placed due to already offering a hybrid version of each model and is therefore well on target. As a result, Toyota have also made a deal with higher emitting Mazda to ‘pool’ their emissions.

But Europe’s largest volume carmakers, VW group and PSA, are still likely to miss targets and will have to pay hefty fines.

In the UK, Brexit won’t make any difference in this case. Even in the event of a no-deal Brexit, the UK government has already put plans in place for a system that mirrors the EU targets, but based upon UK vehicle sales.

3.4 Escalating Targets Will Make Things Even Tougher For OEMs

The European Commission has placed escalating hurdles in front of the OEMs (see Figure 1). It has also tightened the conditions for the New European Driving Cycle (NEDC) testing regime making it harder for OEMs to cheat the testing procedure.

In parallel with the NEDC test cycle, from 2017 to 2018 Europe also phased in the Worldwide Harmonised Light Vehicle Test Procedure (WLTP), which provides a more real world basis for calculating CO2 emissions. Starting from January 2019, all new cars must be certified under WLTP rules. Current NEDC targets will be converted back to WLTP targets for OEMs to reach – which means that the updated targets will be approximately 20% higher than previous NEDC targets. See Figure 1.

Further ahead, the European Parliament has voted to introduce rules that would force OEMs to reach even lower CO2 emissions targets by 2030 of around 60g CO2/km (NEDC) or 72g CO2/km (WLTP).

And even further ahead, many governments around the world intend to ban the sale of ICE vehicles between 2030 and 2040.

4.0 Other Regional Markets

4.1 US Fuel Economy Regulations

In the US, the National Highway Traffic Safety Administration's (NHTSA) Corporate Average Fuel Economy (CAFE) regulation was a standard set by the previous Obama administration.

The US system differs in that it is a fuel economy target (miles per gallon), not a CO2 emissions target. However, for the purposes of this study, CO2 emissions have been converted to mpg and are effectively the same thing as CO2 produced is directly proportional to fuel consumed.

Another key difference is that the U.S. CAFE fuel economy targets are based upon vehicle 'footprint' i.e. the area between the four wheels (i.e. track width multiplied by wheelbase) and not vehicle weight.

Also the fuel economy targets in the US are applied each year, which is quite different from the EU where a hurdle has to be reached every 4 to 6 years, e.g. 2015, 2021, 2025 and 2030 with no requirement to meet targets between these years.

In terms of penalties, FCA was one of the only OEMs that paid a fine in 2016 with a \$77m civil penalty as its cars failed to meet required fuel economy targets.

However, the CAFE standard is currently under a midterm evaluation. In 2018, the Trump administration proposed to "rollback" and freeze the target at the existing 43mpg (equivalent to 127g CO2/km) for passenger cars for 2021 and not continue upwards to the previous target of 52mpg (equivalent to 105g CO2/km) by 2025. This sudden regulatory change in emission targets demonstrates the risk OEMs take in investing in low emissions technologies, especially if the targets can change.

But for now it seems that within the US market, the fuel economy standards and emission targets are likely to be relaxed or delayed at the very least.

4.2 Chinese Fuel Economy Regulations

In China, the Corporate Average Fuel Consumption (CAFC) limit for passenger cars will be 5 litres per 100km in 2020 (this converts to ~116g CO₂/km), and then 4 litres/100km in 2025. (~93g CO₂/km).

Like the EU, China operates fleet average, weight-based targets for individual OEMs. And it has been reported that China has intentionally tried to achieve regulatory alignment with EU CO₂ regulations to help OEMs in releasing global vehicles models.

Like in the EU, the extra cost of making vehicles compliant for Chinese markets (typically \$300 to \$700) has made it harder to sell volume models with slim margins, and OEMs have largely had to absorb the costs as consumers have been unwilling to pay the extra cost.

4.3 Chinese EV Subsidies Being Phased Out

Generous Chinese state subsidies have been very effective at encouraging EV uptake. Sales of fully electric, PHEV and FCEV vehicles grew strongly by 138% year on year in January 2019 due to these subsidies, demonstrating the important role of government in electrification.

However, In June 2019, the China Ministry of Finance announced it would reduce its EV state subsidies by half from 50,000 RMB (\$6,000) to 25,000 RMB (\$3,000) per vehicle to encourage innovation. And they also increased the minimum range for the subsidy as BEVs with less than 250km range will no longer receive any subsidy. The intention of this is to encourage technological innovation. It is expected that China's carmakers will respond by correspondingly increasing the prices of their EVs. And for 2020, the subsidies are likely to be removed completely. And so this regulatory change is likely to slow down and moderate EV growth rates as the subsidies are phased out.

Although not related to CO₂ emissions and climate change per se, after 1st July 2019, China stage VI emission standards were implemented for all new vehicles. These relate to particulate emissions and public health and are some of the strictest in the world. These applied across 15 provinces and municipalities initially, including Beijing and Shanghai. For 2020, the regulations will apply to all of China. All existing vehicles on the roads must now also comply with China stage V emission standards.

5.0 What Are The Options Available To OEMs?

5.1 Option 1: Cheat The Emissions Tests

VW, BMW and Audi have all been exposed for cheating emissions tests and have had to pay heavy fines, so this is no longer an effective strategy. For example, In April 2017, a US federal judge ordered VW to pay a \$2.8bn fine for “rigging diesel-powered vehicles to cheat on government emissions tests”. And the new WLTP emissions testing cycle is harder to cheat as it emulates more real-world conditions, so cheating is no longer an option.

5.2 Option 2: Do Nothing And Just Pay The Fines

Based upon current 2018 EU fleet average emission of 120g CO₂/km, this would result in OEMs collectively fined around €24.7bn a year. The EU fines and ‘limit value curve’ were intentionally designed in this way to be more expensive than compliance and to prevent the OEMs from ‘just paying the fines’.

Furthermore, the automotive industry dislikes the idea of fines as it believes the money would be better spent on developing and introducing EV technologies. And paying fines rather than investing in technology is not a good strategy given that the emissions targets get even tougher further ahead.

By 2030, The EU CO₂ Emissions Target Will Be A Further 37.5% Lower Than 2021 Levels And Be 60g CO₂/Km (NEDC).

5.3 Option 3: Full Compliance

The technology cost for the OEMs of fully complying with EU CO₂ targets in 2021 has been estimated at €11bn. This would either hit profits hard and/or increase the price of vehicles, potentially pricing consumers out and thus failing to achieve the sales volume required to change the product mix significantly towards low emissions vehicles.

One of the unintended consequences of the EU’s 2030 emissions targets could well be the demise of the small car, or at least those built in Europe. As Table 2 indicates, the price premium of even mild hybridisation could wipe out the already slim margins on high volume small cars, making them unviable. VW has acknowledged that without fitting expensive emissions-reduction technology to small cars such as the Up! and the Polo, they will not meet the 2030 emissions targets.

And in this scenario, the European OEMs have raised the spectre of Chinese volume EV manufacturers stepping in to provide Europeans with small cars if European OEMs are unable to produce them profitably at affordable prices.

Table 2 Cost Premium of Hybrid & EV Powertrains 2019 (Type, Additional Cost, CO2 Saving)

Type	Additional Cost	CO2 Saving
"Mild" Hybrid	\$550 - \$1,100	5% - 11%
Full Hybrid	\$3,000 - \$5,000	23% - 34%
Full EV	\$10,000 - \$12,000	100%

Source: Automotive from Ultima Media 2019

5.4 Option 4: Pooling / Trading CO2 Credits

As mentioned previously, FCA has brought CO2 credits from Tesla for €1.8bn to help meet FCA's CO2 targets for 2020 and 2021. This is an expensive and short-term option especially as the targets will get higher. As such, FCA plans to meet its targets from 2022 onwards without any CO2 credit deal with Tesla.

But critics have argued that CO2 trading is 'greenwashing'. Rather than FCA investing €1.8bn on new technology to reduce emissions, it boosts Tesla's EV R&D as it struggles to achieve profitability. This is great for Tesla, but bad for the overall industry effort to collectively reduce CO2 emissions.

5.5 Option 5: Sell Vehicles At A Loss

Some HEVs and EVs are being sold at cost price or even at a loss to stimulate sales and encourage the product mix towards low-emission vehicles to help reach CO2 targets. However, ICE vehicles are the cash cow for most OEMs. Over time EV prices will fall, primarily due to the expected economies of scale with batteries, but until that happens, OEMs could be facing the prospect of selling EVs at a loss for a period of time. As OEMs are already facing declining profits, many would likely need to restructure to remain profitable, including reducing production capacity and jobs.

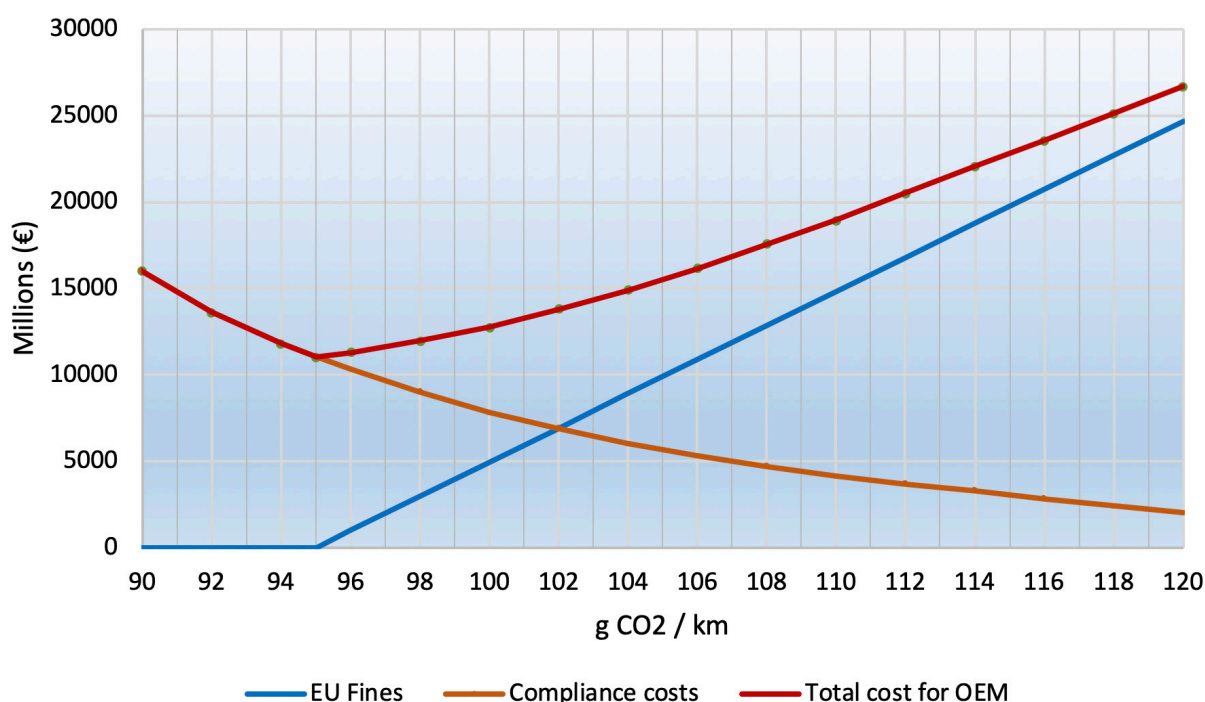
5.6 Which Option Will The OEMs Choose?

Figure 2 illustrates the range of options available to OEMs from keeping emissions in 2019 at 120g CO₂/km, ranging all the way to full compliance and even beyond the target of 95g CO₂/km in 2021.

We expect that the EU fleet average emissions for 2021 will be 100g CO₂/km and *nearly* reaching the target, but more importantly from the OEMs' perspective, it gets close to the optimal balance of compliance costs vs. fines. It's also worth noting there is also the potential risk of over complying and coming in well below 95g CO₂/km, where the compliance costs escalate considerably with no gain for the OEMs. So the OEMs need to tread a fine balance.

In 2021 Automotive OEMs Selling Into The EU Will Have Compliance Costs Of €7.8bn And Fines Of €4.9bn Incurring A Total €12.7bn Annual Bill, Effectively Halving Their Eurozone Profits

Figure 2 Cost Comparison of OEMs Paying Full EU CO₂ Fines Vs. Full Compliance 90g CO₂/km – 120g CO₂/km For 2021 (€m)



Source: Automotive from Ultima Media 2019

Note:

Compliance costs refer to the extra cost of fitting emission-reduction technologies to new vehicles.

EU fines refers to the €95 fines for each 1g/km that the OEMs fleet is over their individual target multiplied by their entire EU sales volume.

6.0 Consequences

- From our analysis it seems the OEMs have chosen a strategy that appears to be a mixture of mostly complying and accepting that some fines may well have to be paid. Nonetheless, we forecast that OEMs will have compliance costs of €7.8bn, with fines of €4.9bn resulting in combined compliance costs and fines of €12.7bn in 2021. These are annual costs, and we estimate this will effectively halve their European profits, making the region much less attractive to OEMs. There are already signs of this in that US-based OEMs barely feature in EU sales and only Ford participated in the recent 2019 Frankfurt motor show.
- The CO2 emissions targets won't just affect OEMs but will also reverberate down the entire supply chain as OEMs apply pressure upon Tier suppliers to provide affordable, low-emission technology. And there is evidence that Tier 1 suppliers are already reporting financial strain in the current climate.
- But it's not just technological solutions that are required. Automotive industry executives are correct in saying that meeting emissions targets is not entirely within their control. The tax regime, state subsidies and incentives will be vital in persuading consumers to purchase electric vehicles and to get anywhere close to reaching emission targets.

7.0 Opportunities

- However, the current situation does provide numerous opportunities for businesses to capitalise upon. For example, huge growth is expected for hybrid powertrain specialists, 'micro hybrid', stop-start systems, EV battery suppliers and everyone within the EV supply chain, including IT specialists developing embedded software for battery range and performance optimisation.
- Given the tough EU CO2 emission targets that could price some OEMs out of the EU market, this raises the spectre of new competitors filling the void, especially from China. While this poses a risk to automotive jobs in the EU, it would of course create opportunities for new entrants and within the wider supply chain.
- New start-up EV manufacturers (as has been demonstrated by Tesla) could potentially benefit hugely from CO2 credit deals that would help them invest in developing their products further.
- There will be opportunities in tangential technologies that assist in reducing emissions, such as lightweight materials and low-rolling resistance tires. Beyond the vehicle itself, there will also be related opportunities within charging station infrastructure developments and wireless charging technologies.

Automotive from Ultima Media's forthcoming series of reports will expand upon the potential for these dynamic enabling technologies and reveal the opportunities for new revenue streams and business growth.

8.0 Appendix

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