2025 CO_2 Regulation

The next step to tackling transport emissions

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A briefing by TRANSPORT & ENVIRONMENT

Summary

Vehicle CO2 standards are one of the EU's most successful climate policies. They stimulate innovation and maintain the competitiveness of the EU automotive industry by creating a market for technologies that improve fuel efficiency. They deliver substantial greenhouse gas savings at a negative societal cost; the money saved by drivers on fuel is spent in other economic sectors stimulating local economies and creating jobs. The policy also reduces the EU's daily €1bn spend on oil imports[1] and thereby improves energy security and balance of payments. It responds to many of the identified priorities of the new European Commission. Cars are currently regulated to 2021, vans to 2020 and trucks not at all. New standards to 2025 could deliver a significant share of the cuts that will need to be made in transport to deliver the 2030 Climate and Energy goals – specifically the 30% emission reduction from 2005 levels in non-ETS sectors where standards could provide between a third and two thirds of the required emissions reductions in transport.

In the absence of standards, improvements in fuel efficiency stagnate and investment declines. But standards create a level playing field in which EU companies compete strongly against US, Japanese and Korean competitors and can sell new technology globally to meet the increasing drive for more fuel efficient vehicles. Cost-effective technologies to reduce emissions from conventional vehicles from an average 95g/km to 70g/km are available and anticipated to payback in lower fuel bills within three years. Smartly designed regulation can also drive plug-in vehicles into the market providing choice for car-buyers that is currently lacking by stimulating sales of battery electric, plug-in hybrid and fuel cell cars.

2025 fleet average CO_2 targets for vehicles will maintain progress in improving fuel efficiency; will address weaknesses in the current regulation that means less than half the measured improvement in emissions is actually delivered on the road; will provide investment security to innovative companies developing new technologies and help maintain the competitiveness of the EU industry that is falling behind Asian competitors. Standards will benefit drivers, the EU economy, jobs and help deliver climate goals. 2025 vehicle CO_2 are a win-win solution and should be proposed by the Commission in early 2016.

1. Why regulate cars and vans?

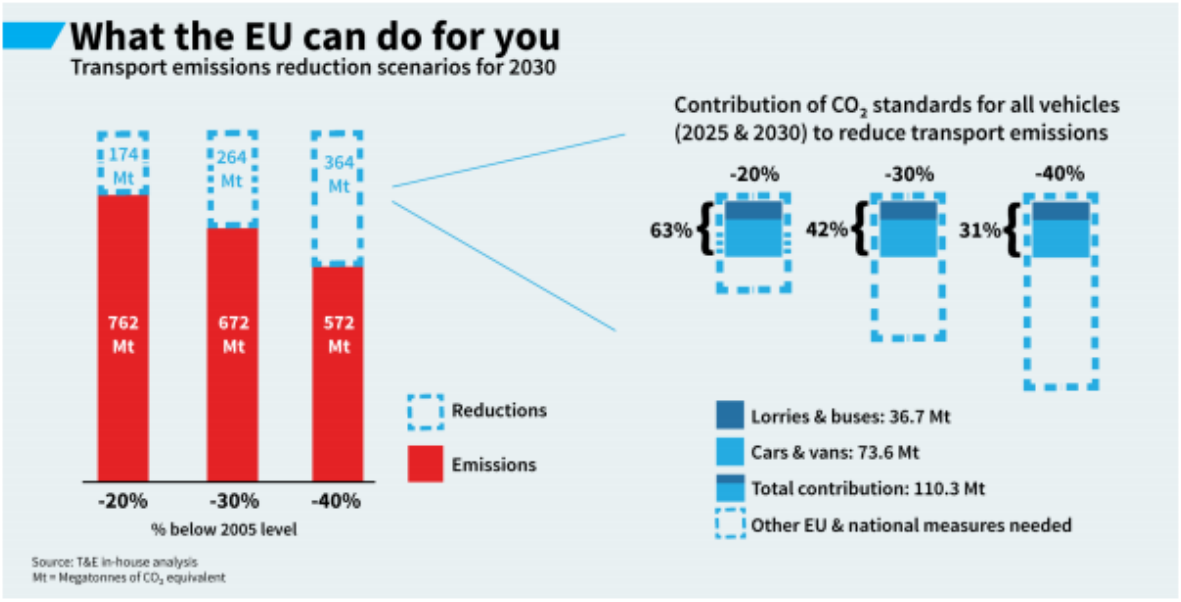
1.1. To help deliver 2030 climate and energy goals

Dangerous climate change (warming above 2°C) cannot be avoided without radical decarbonisation of cars and vans. In the EU, transport CO2 emissions have risen by 29% since 1990 with 12% of the total EU emissions now arising from the exhaust of cars.[2] Emissions reductions in other sectors are being largely offset by the increase in those from transport. Whilst aviation, shipping and trucks can reduce their emissions cars and vans are the dominant source and the greatest potential and must therefore make the largest contribution.

As part of its 2030 Climate and Energy Package the EU has set a target to reduce emissions in the non-ETS sectors (principally buildings, agriculture and transport) by 30% from 2005 levels. Each sector will need to cut emissions and with aviation and shipping emissions excluded, technology to

improve vehicle efficiency and shift away from fossil fuels must deliver the main bulk of the contribution required from transport.

30% ESD target means the required non-ETS emissions reduction is 936Mt from 2005 to 2030. Realistically transport will need to make a sizable contribution to achieving this reduction, for example a 20-40% reduction in the sector contributes 174-364Mt. Fortunately CO_2 standards for cars, vans, trucks and buses can contribute over 110 Mt.[3] It is clear that a holistic approach to tackling transport emissions is needed, including policies to reduce journeys and switching modes to low and no carbon solutions. But more efficient vehicles, driven by CO_2 standards are a key component of delivering the EU's climate goals. Such standards will do considerable heavy-lifting of the reduction required from the non-ETS sectors as a whole thus leading to fewer national measures needed in Member States.



Source: Transport and Environment 2015[4]

1.2. Because standards are good for drivers, jobs and energy security

On average about 2.5 Kg of CO_2 is produced from burning 1 litre of fuel in vehicles.[5] Low carbon, fuel efficient vehicles therefore save drivers and businesses money through using less fuel. A target of 70g/km[6] for cars in 2025 would save a new car buyer €350 pa and payback the costs of technology within 3 years.[7] It would also increase spending on other goods and services boosting national economies and employment. 660 thousand to 1,1 million jobs are expected to be created by 2030.[8]

The EU would also import less oil, strengthening balance of payments and reducing the flow of Euros to Russia, thus improving regional security. Fuel efficient cars are a quadruple-win for drivers, the economy, energy security and the environment. But the failure of the voluntary agreement and 20 year stagnation of truck fuel efficiency demonstrates that the automotive industry makes virtually no effort to supply more fuel efficient vehicles unless it is required to do so though regulation.

New car buyers heavily discount potential future fuel savings in purchase decisions. As a result, without regulation, relatively few of the most fuel efficient models are purchased and made available to the second and third user car market that does value lower running costs. Regulation of new cars therefore benefits all drivers by ensuring the car fleet becomes progressively more efficient whilst retaining customer choice. If the cost of fuel efficient technologies is passed on to customers and pay back within the period of the first owner (typically 3-5 years) there are only winners.

2. Why set a 2025 target?

2.1. Because stretching, realistic targets with long lead times are the optimal approach

The current car regulation has been effective because it sets a stretching target with a long lead time. The first (2007) proposed regulation for cars provided an 8 year lead time to 2015; as did the second (2012) proposal for the 2020 target (revised to 2021 through the Co-decision). A proposal in 2016 for 2025 will provide a similar period for automotive industry to develop and deploy the technologies needed to meet their goals. This matches the model cycle of 5-7 years for most carmakers. A 5 year cycle of progressive targets provides regulatory consistency to the industry that is sent a clear policy message continuous improvement is essential. It provides planning and investment security that is so important to help prioritise research and development activities. In contrast delays to proposing a target will reduce the lead time for carmakers and provoke inevitable complaints there is insufficient time to prepare - this is the underlying reason for carmakers constant calls for delay.

The German Environment Minister Hendricks commented in March 2015 that: *standards have proven to be a driver for innovation for the car industry (…) The existing CO2-regulation in transport has proven efficient and will be continued*.[9]

2.2. Because the transition to low carbon technologies represent an opportunity the automotive industry

A UK study[10] has highlighted the opportunity of low carbon vehicle policies to drive investment and industrial renaissance. One car manufacturer observed that in 2003, *environmental regulation was seen as a threat not an opportunity*. But through specifically focusing on low carbon vehicle initiatives the UK has in a decade grown automotive manufacturing sector turnover of 38% despite the global financial crisis. Specifically 291 unique low carbon investments by 85 different companies were identified in ten years a projected investment of £40bn. UK specific policies, complemented by EU car regulations have been driving the successful transition. One commentator from a manufacturer noted that *at the highest level, the creation of a level playing field [CO2 target] by the European Commission was extremely helpful. A clear long term target is what industry needs – it will find a way to respond*.

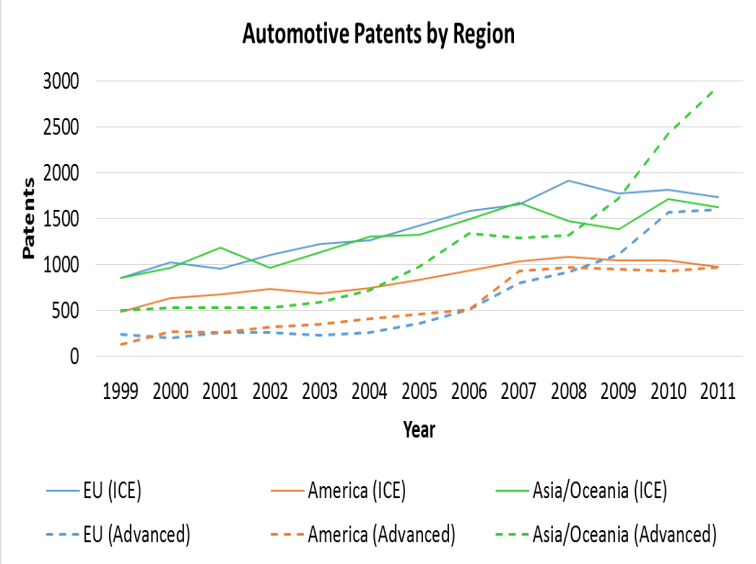
Repeated claims by ACEA (the European representative organisation of carmakers) that regulation will devastate their competitiveness have been repeatedly shown to be not supported by any evidence. For example; in 2007, Sergio Marchionne, then President of ACEA and CEO of Italian carmaker Fiat, declared that, *the recent proposal from the European Commission, which demands a mandatory target for new cars of 130 grammes CO2 emissions per kilometre by 2012, is too costly*

and will force the industry out of Europe.[11] Despite these claims, Fiat and every other European carmaker reached its 130g/km target early: A European Commission study examining the competitiveness effects on the automotive industry also concludes that p*ost-2020 EU LDV CO2 legislation will not directly affect competiveness of EU car manufacturing, component manufacturing and fuel or energy supply industry.*[12]

2.3. Because the EU is falling behind in developing advanced technology

Car CO_2 regulation has in particular provided important investment security to automotive suppliers that have delivered a menu of solutions for carmakers to integrate. Despite the economic recession investment has been maintained and Europe remained a centre for automotive innovation and development increasing employment in high value engineering. Automotive suppliers agree stating that "The EU CO2 legislation for passenger cars has largely been a success in driving innovations, lowering CO2 and offering planning certainty."[13] In the absence of a 2025 regulation the industry will reduce investment in developing low carbon technologies. This will have potential implications for jobs in the short-term and long term global competitiveness.

There are already alarming signs EU carmakers are falling behind Japanese and Korean competitors in obtaining patents for advanced technologies (hybrid, plug-in hybrid, battery and fuel cell vehicles).[14]



The EU focus on diesel technology is not replicated in other major vehicle markets. Of the 68 million cars manufactured globally in 2014 just 10 million were diesels and 7.5M of these sold in Europe. This implies on average the share of diesel in non-European markets is lower than 5%.

2025 standards will drive the development and deployment of advanced low carbon technologies in demand globally and help to ensure European carmakers remain globally competitive and not overly focused on marginal diesel solutions.

2.4. Because there is too much uncertainty about 2030

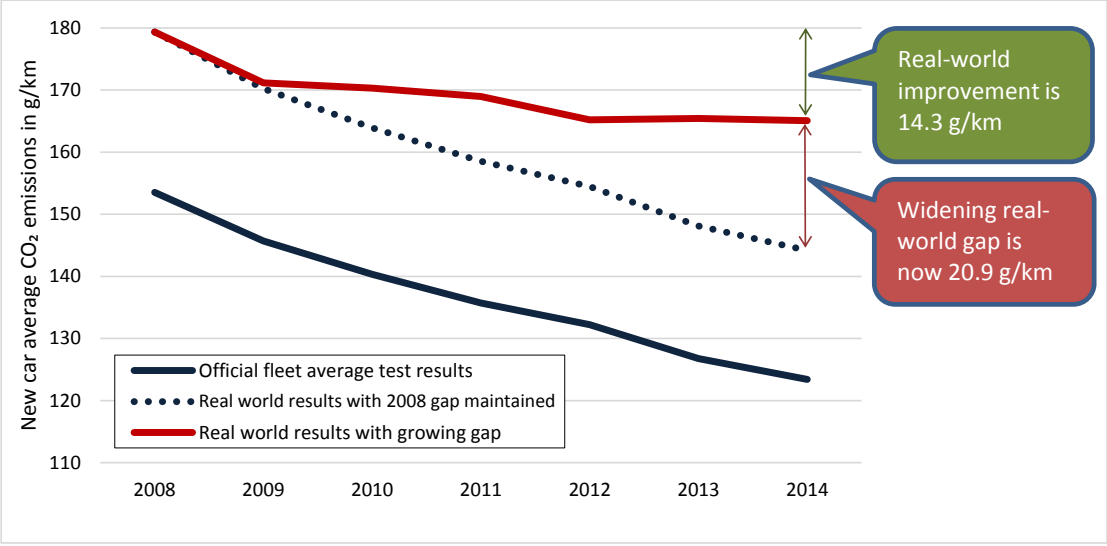
It is, however, premature to set a 2030 goal as there is too much uncertainty on future technology costs and take-up in 15 years time (two full new model cycles). Notably sales of electric vehicles is likely to accelerate significantly during the decade 2020-30 as new battery technologies emerge offering longer ranges and lower costs. Furthermore, for standards to make a material contribution to the -30% by 2030 target for the non-ETS sectors, efficiency must be improved early in the decade to allow for a sufficient number of years of more efficient cars to enter the fleet. To facilitate this a declining annual target should be introduced from 2022 to 2025 with a system of banking and borrowing credits to provide flexibility for manufacturers.[15] However, carmakers want to delay even formulating a future standard until 2030. This irresponsible attitude will put at serious risk achieving

climate goals and sacrifice the industry's long term global competitiveness for higher short-term profits.

In 2013 the European Parliament proposed a 2025 target should be set in the range of 68-78g/km and the European Commission committed to assess this range. Carmakers complained about *unrealistic and politically-motivated long-term targets without a scientific basis*,[16] but the industry now wants the European Commission to delay even formulating a target until 2030.[17] This is despite their previous stated position that *en route to 2050, it is clear that further ambitious targets will need to be set.*[18]

2.5. Because the stringency of the 95g target has been effectively halved by an obsolete testing system

Manipulation of the current obsolete NEDC testing system means that there is a widening gap between the emissions measured in official tests (and used to assess if the regulation has been met); and, real world performance. **In practice only half the measured improvement in emissions and fuel consumption has been delivered on the road**.[19] This has created a huge benefit for carmakers who in practice have only needed to deploy half the anticipated technology on vehicles to achieve their targets. The new WLTP test will replace the current discredited system, hopefully from 2017, but requires company targets to be revised to account for the new test. In doing so the Commission has made a commitment to ensuring "comparative stringency" which means most of the current "flexibilities" in the test exploited by carmakers to unfairly lower test results are being allowed for in the target translation exercise. In practice this means the WLTP based targets include an allowance for the current manipulation of the NEDC test. Setting an ambitious 2025 target will lead to the on-road fuel economy anticipated when the 2020, 95g/km target was originally agreed in 2009. Delaying setting a target until 2030 means the ongoing abuse of the testing system will effectively continue for another 15 years despite the introduction of WLTP. The figure shows official CO_2 test results versus the real world performance.



The effect of the growing gap between test and real world performance is that the EU 95g/km target is not, as claimed, the most stringent in the world when test practices are taken into account.

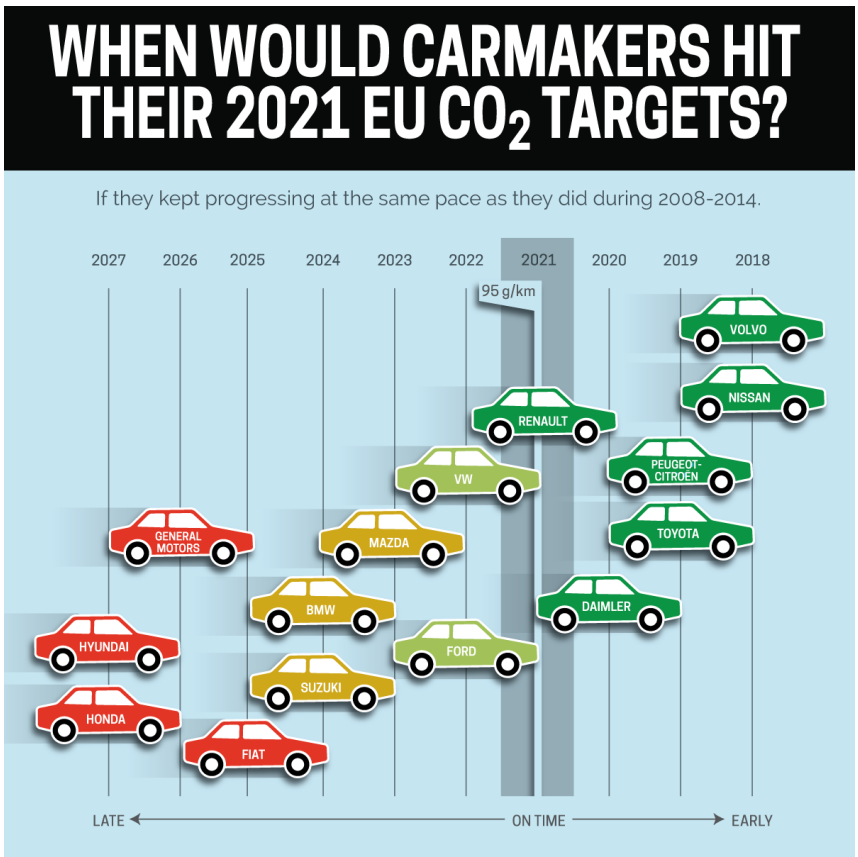
2.6. Because the 2020 vans target is irrelevant

Industry progress towards the vans targets are even more rapid than for cars. The most recent analysis of progress by the European Environment Agency for 2014 stating … *average emissions of 169.2 g/km, significantly below the 2017 target of 175 g CO_2/km, which was already reached in 2013, four years ahead of schedule*.[20]

The analysis information on which the 147 g/km target was based was flawed, hugely exaggerating the costs and that average emissions of vans were around 203 g/km in 2010 whereas the actual level was 181 g/km. A vans target of equivalent stringency to cars for 2020 is 118g/km and that equivalent to 70g/km for 2025 100g/km.[21] Tighter targets for vans would extend the market for low carbon technologies reducing costs, creating jobs and developing export opportunities. In the absence of a 2025 proposal there will be a "technology graveyard" for vans as manufacturers reduce investment and fail to deploy available technology despite low carbon technologies for vans being effectively the same as those used in cars. Setting tighter targets would have the opposite effect and drive the uptake of innovative, low carbon solutions in the vans market.

3. Do vehicle CO_2 standards really work?

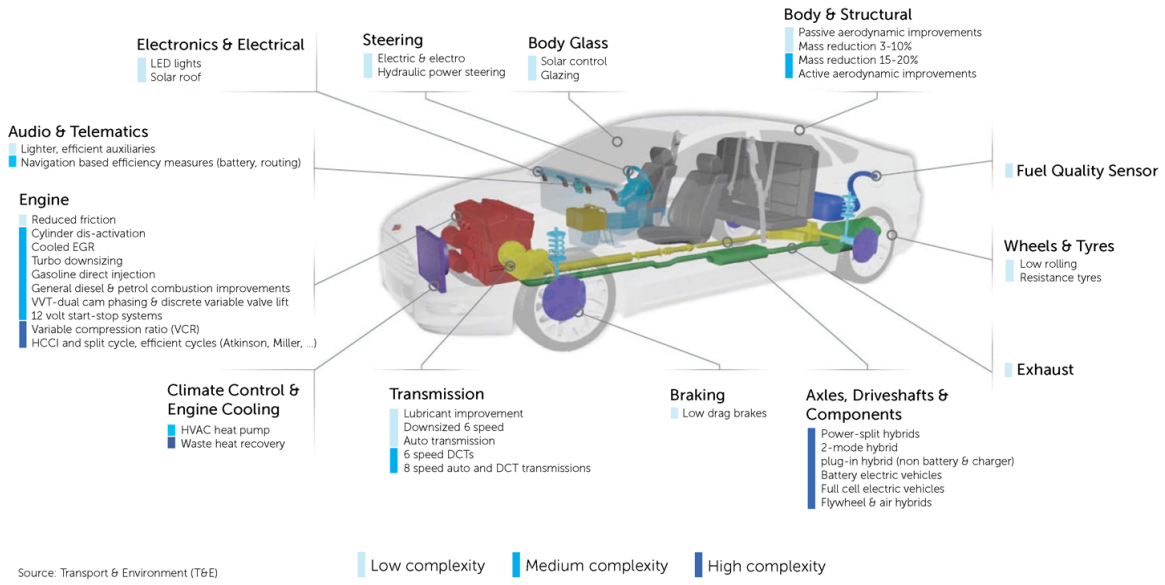
Fortunately since EU car CO_2 regulations were proposed in 2007 they have been shown to be highly effective with average emissions falling by 3.6%pa.[22] This is three times the rate achieved during the failed voluntary agreement. Many countries have also developed national tax policies and other incentives to encourage the purchase of low carbon models. The most successful of these countries (e.g. the Netherlands) are delivering annual improvements of more than 5%pa - double the rate of countries with weak policies. Overall average emissions of 95g/km for cars are expected to be achieved by 2021[23] (as illustrated) and almost all companies met the intermediate 2015 target ahead of schedule.



4. How will a 2025 target be delivered?
4.1. Through cost-effective efficiency improvements

A range of cost-effective technologies to improve the efficiency of conventional vehicles to well below the 95g/km 2021 target are available. But these new technologies will not be further developed and deployed on cars without a regulatory requirement. 2025 standards are therefore needed to continue to drive technology into the market and ensure European companies remain at the cutting edge in developing fuel efficient technologies. A study underway by the European Commission [24] has identified 34 separate technologies that can improve the efficiency of conventional vehicles beyond 2020. Automotive suppliers confirm that they are …. *developing a wide range of technologies for further CO2 reductions post-2020*; and that there is, *additional potential via both increased efficiency of the internal combustion engine and increasing market shares of alternative powertrain vehicles*.[25] The figure illustrates the range of possible solutions based upon the Commission research.

Plenty of room for fuel efficiency improvements



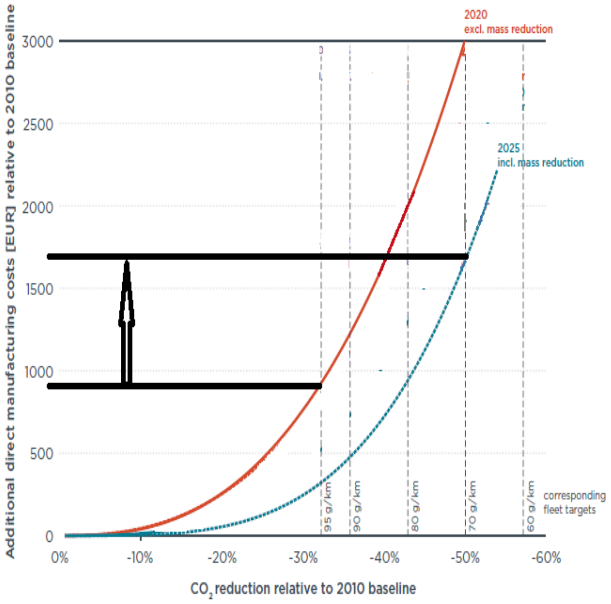
Source: Transport & Environment (T&E)

Some of these technologies will show benefits on the new WLTP laboratory test; others only in real world driving. Extending the scope of the 2025 regulation to encourage a wider range of "Eco-innovations" and stimulate more efficient auxiliary equipment such as that for heating and cooling will be important to deliver real-world improvements in emissions. Anticipation of a 2025 regulation is already driving an accelerating supply of new solutions. An example (boxed) illustrates a technology so new it has not even been included in the Commission study.

SP3H PROFILING SOLUTIONS

The French technology company has developed a fuel sensor that precisely measures the composition of fuel enabling the engine to operate more efficiently. They believe savings of 5% on fuel are possible more on air pollutants. The company are applying for an "Eco-Innovation," a technology that improves efficiency on the road, where is matters, not just in tests.

A particularly important change will be to make cars lighter using new materials that will also offer safety benefits. Simply changing the design of the regulation to base carmakers targets on the average size, not mass, of the vehicle, will achieve appreciable CO_2 benefits and complement other solutions to improve the efficiency of conventional vehicles to levels significantly below the 95g/km target.



The graph shows additional direct manufacturing costs of moving from 95g/km in 2020 without deploying light weighting technologies to 70 g/km in 2025 with light weighting.[26] For 2020 little light weighting of cars is expected and the weight of cars has been effectively unchanged for a decade.[27] This is because most of the benefit of making cars lighter in terms of efficiency is offset by making company targets lower. But a switch to setting company targets to the average size of the cars produced will encourage a shift to light weighting technology and significantly lower the cost of complying with the regulation. The cost is around €750 for a petrol vehicle and similar for a diesel.

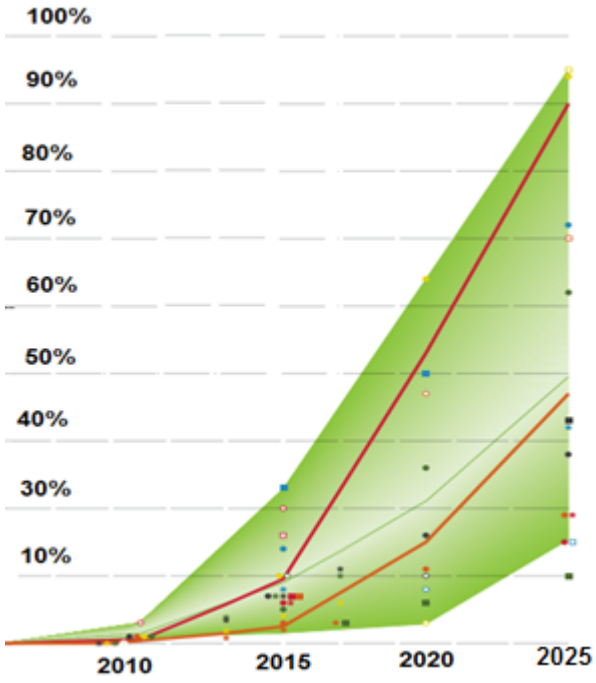
Repeated carmakers claims that regulation will make cars unaffordable have been repeatedly shown to be scaremongering. In 2003 a study for ACEA claimed a target of 120g/km could only be achieved at a cost of €4000 and with extensive penetration of alternative technologies.[28] . Commission analysis suggests this was overestimated by about an order of magnitude.[29] In 2007, carmakers said, a *vehicle-related target of 130 grams CO2 /kilometer, as proposed by the Commission, is not feasible.* Yet almost every ACEA member has met this goal early. In reality, automotive engineers are delivering the regulatory requirements more cheaply than forecast and the costs of buying a car have not increased. Winfried Kretschmann, minister of Germany's federal country Baden-Wuerttemberg, recently commented, *the company car I inherited by my conservative predecessor emitted 340 Gram CO2. My new Mercedes S Class is a Plug-in-Hybrid emitting 65 gram. The fact that these cars exist is a result of the EU's emission limits.*[30]

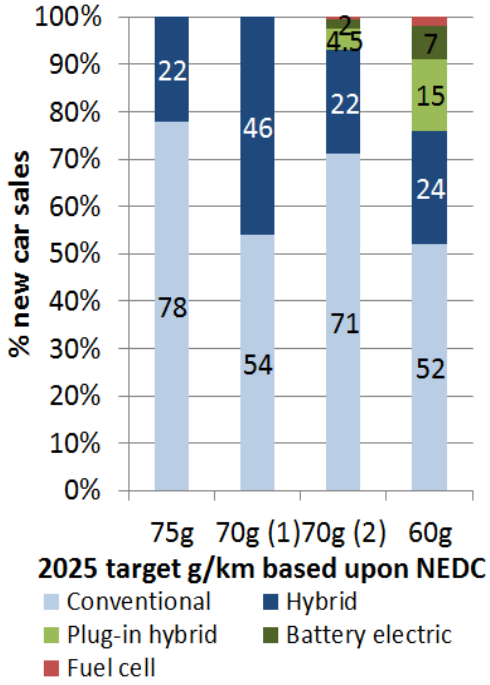
4.2. Through increasing penetration of electric cars

Electric cars will play an increasingly important role in reducing new car CO_2 emissions. Sales continue to grow strongly, increasing by around a third in 2014 and now represent 0.5% of the new car market. In countries that have developed strong incentives and infrastructure for recharging (like Norway and the Netherlands) sales are already over 5%, [31] significantly higher than the average. All scenarios are for the market to continue to grow strongly – although forecasts vary widely (as illustrated).[32]

By 2020 a number of forecasts cluster around the 5-10% of new car sales level; but for 2025 the forecasts vary widely averaging 20% but ranging from 5-over 50%. This uncertainty arises from a number of factors including future costs and performance of batteries; consumer acceptance; policy support. One important issue is the lack of customer choice with just 20 electric models on sale compared to over 500 conventional vehicles. All of these issues must be addressed but supply

could be encouraged through setting a sub-target for ultralow carbon vehicles as part of a 2025 cars and CO2 regulation which would encourage all carmakers to supply models (at present Fiat and Ford do not). Such an approach, a Flexible Mandate is described in Section 5.





Because of uncertainty of future electric vehicle sales the target for 2025 should be set at a level that encourages carmakers to supply new models with innovative business models (such as electric car-sharing) but not be overly dependent upon their supply for meeting the 2025 target. A target of 70g/km can be met through hybridisation of a significant share of new car sales in 2025. Or it could be met with a limited proportion of ultralow carbon vehicles as illustrated.[33] By developing a system in which carmakers could trade sales they could decide whether to supply or buy the required allowances and new and specialist entrants would be encouraged into the market.

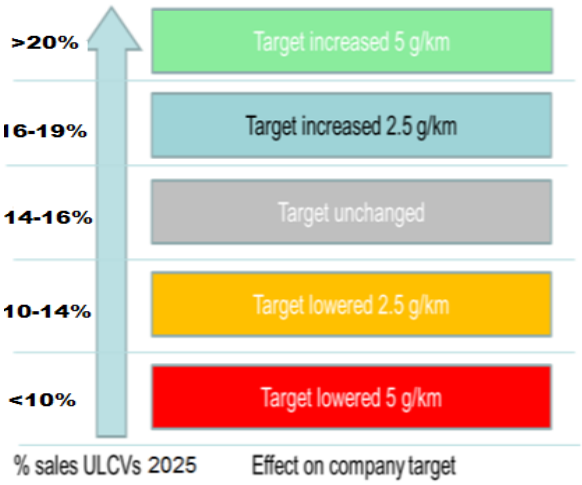
5. Conclusions and policy recommendations

CO2 car and van standards **for 2025** are a logical and essential element of delivering the 2030 Climate and Energy Package and necessary to set cars on the pathway to zero emissions in use that will be necessary to avoid dangerous climate change. As part of the package of proposals with the 2030 Effort Sharing Decision on the non-ETS emissions the Commission should include a series of measures to assist Member State meet their goals - this includes standards for 2025 for cars and vans but also trucks.

A target[34] of **70g/km** or less for passenger cars and **100g/km** for vans for 2025 can be delivered cost effectively. with a payback period of less than three years and without requiring a significant penetration of electric cars (<10% of sales). To incentivise companies to meet their targets the existing penalty of €95/g/km/vehicle would apply. Exemptions for niche and specialist manufacturers would remain but company targets should be based upon the average footprint (size) of vehicles sold, not their weight, to encourage light weighting and lower costs of regulation by some 15%.[35]

Continuing with a fleet average, tailpipe metric is the optimum way forward for 2025. But 5 year stepped targets should be replaced with annual reductions from 2022 onwards together with a flexibility mechanism to allow carmakers to bank excess credits and borrow up to 5 g/km in allowances in any single year to avoid disrupting model renewal cycles.

To encourage the supply of ultralow carbon vehicles (ULCVs below 50g/km), a flexible mandate should be introduced. This would set a sub-target for every company to supply 15% of ULCVs in 2025. Companies overachieving the target would receive a bonus reduction in their fleet average target. Companies underperforming would be expected to achieve a lower fleet average target. Trading allowances would encourage new entrants and specialist suppliers. To encourage sales of ultra efficient vehicles electric quadricycles should count towards the target.This is based upon the Zero Emission Vehicle Mandate used in California but has additional flexibility for carmakers.



Further details of T&E proposals to strengthen the current regulation will be announced in due course.

Further information

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Endnotes

[1] ECF 2013, Fuelling Europe's Future; http://europeanclimate.org/fuelling-europes-future/
[2] DG Climate Action 2015; http://ec.europa.eu/clima/policies/transport/vehicles/cars/index_en.htm
[3] Assumes cars and vans achieve 70g/km and 100g/km respectively in 2025 (based upon the NEDC test); 55g/km and 75g/km in 2030; trucks reduce emissions by 35% reduction by 2030 compared to 2015
[4]Transport and Environment 2015, Road to 2020; http://www.transportenvironment.org/what-we-do/cars-and-co2/Publications
[5] Assumes approximately 50:50 diesel and petrol
[6] Figures are based upon the existing NEDC test cycle - equivalent to c80g/km on the new WLTP test.
[7] Assumes direct manufacturing costs of €700; an uplift for indirect costs 1.24; 20k km pa from a new car; €1.35/l; a real work uplift of 1.31
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[14] Based upon OECD data
[15] Carmakers would receive annual targets but be allowed to either bank credits from overachieving the target in previous years; or borrow up to 5 g/km of allowances to meet their goals. Any borrowed allowances would need to be completely paid pack by an agreed date.
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[22] Transport and Environment 2015, Cars and CO2 report 2015; http://www.transportenvironment.org/what-we-do/cars-and-co2/Publications
[23] Ibid 22
[24] DG Climate Action, 2015, Delphi Study 2015
[25] Ibid 13

[26] ICCT 2013, Mass reduction impacts on EU cost curves; http://www.theicct.org/mass-reduction-impacts-eu-cost-curves
[27] Ibid 22
[28] ADL 2003 Investigation of the consequences of meeting a new car fleet target of 120g/km by 2012.
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[33] AEAT 2013; Exploring possible car and van CO2 emission targets for 2025 in Europe; http://www.transportenvironment.org/sites/te/files/publications/Ricardo%20AEA_2025%20targets_Report_Jan_2013_0.pdf
[34] Targets are NEDC equivalent numbers. In practice the target must be set on the WLTP equivalent value.
[35] Ricardo AEA 2014, Improving the understanding of potential weight reduction of cars and vans; http://ec.europa.eu/clima/events/docs/0103/downweighting_en.pdf