



European Federation for  
TRANSPORT and ENVIRONMENT

## BACKGROUND BRIEFING: WEIGHT vs FOOTPRINT

European Federation for Transport and Environment

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# Weight-based standards make CO2 targets harder to reach

**No to weight-based standards:** they punish weight reduction, one of the most important methods of improving efficiency and reducing CO2.

**Yes to footprint-based standards:** they leave more options open to carmakers for reducing CO2 and do not penalise weight reduction as a compliance option.

## Introduction: the proposal should not be based on vehicle weight

In December 2007, the European Commission proposed the introduction of legally-binding fuel efficiency standards for new cars. The proposed law says the average new car sold in Europe in 2012 should emit no more than 130g CO2 per kilometre as measured on the official EU test-cycle.

T&E believes, and has long argued, that a single, legally binding, fleet-average standard is the best way of achieving the goal for new car CO2 reductions.

But in addition, the Commission's proposal says that CO2 limits should be differentiated according to the type of car and that the so-called 'utility parameter' used to define the targets should be the car's weight. In simple terms the proposal says heavier cars should get easier (higher) CO2 standards and lighter cars should get tougher (lower) ones.

This briefing argues that if a utility parameter is to be used, it should not, under any circumstances be based on weight, but rather on the car's footprint (the area between the four wheels). The negative implications of weight-based standards are described below. Every one could be avoided if Europe opted for a single fleet-average target, or footprint-based targets.



Weight-based standards give SUVs (above left) a higher (easier) CO2 target than more efficient family cars of a similar size.

## The importance of weight reduction for energy efficiency and lower CO2 emissions

*"They fight for every gram"*

James Muir, CEO Mazda Motor Europe referring to Mazda engineers' work on the redesigned Mazda2 which is around 30kg lighter than the previous version. Automotive News Europe, 10/03/2008

*"We have to cut weight. The industry has to cut weight."*

Bob Carter, Group VP, Toyota, referring to the importance of weight reduction in improving efficiency. AutblogGreen.Com, 17/02/2008

**The reason weight reduction is so important for energy efficiency is basic physics: the greater an object's mass, the larger the amount of energy required to move it.**

Long time fans of professional cycling will have noticed that bicycles get lighter every year. A few years ago, racing bike frames were made of steel, then aluminium, and now carbon fibre. In addition, every component is reengineered to make it lighter, and every gram counts. Every gram of weight counts when the energy is human. The same should be true when the energy comes from transport fuel such as petrol and diesel which is even more precious because oil is getting harder to find and more environmentally damaging to refine.

Fuel consumption, emissions and vehicle weight are strongly related. Reducing weight is a very important method of improving efficiency, and therefore reducing CO2 emissions.

**In car design, lighter vehicles use less energy to accelerate; they use less energy to overcome the friction between the tyre and the road surface (known as rolling resistance) and also use less energy to climb uphill.<sup>1</sup>**

<sup>1</sup> 70% of the energy used by a car in the official EU car test cycle has a relationship to weight: 40% is needed for acceleration and 30% for rolling resistance. Cars are not tested going uphill.

According to the European Commission, reducing a car's weight by 100 kg leads to lower CO2 emissions of 7.6 g/km<sup>2</sup>.

**Weight reduction plays a very important role in improving fuel efficiency and lowering emissions. So any future energy efficiency / CO2 reduction strategy for new cars must not discourage weight reduction.**

## Weight-based standards punish weight reduction

Carmakers who make cars lighter will get punished with a tougher CO2 standard under the Commission's proposed weight-based system. This creates a very serious problem.

The table below illustrates what happens when a car reduces its weight by 100 kg under the weight-based system proposed by the Commission.

	Weight (kg)	CO2 target for 2012 under EC proposal (g/km)	Actual CO2 emissions (g/km)	Emissions reduction made (g/km)	CO2 reduction needed to reach target (g/km)
VW Golf 2007	1376	134	139	-	5
VW Golf (100 kg lighter)	1276	129	131	8	2

The table shows the example of a VW Golf, a typical family car weighing 1376 kg. This car would have to reduce its CO2 emissions by 5 g/km to reach its target of 134 g/km by 2012 under the Commission-proposed weight-based system. Cutting the car's weight by 100 kg would take it from 139 to 131g, overshooting the original target by 3g. But bizarrely, that same weight reduction would result in a penalty in the form of a tougher CO2 target. Even after reducing CO2 emissions by more than necessary, the Golf has to go further and reduce by 2g more.

Imagine running a marathon. The distance is 42 km, but if you start to run faster, the distance to the finish line increases. You increased your speed by 0.5 km/h so the marathon is now 44km. The incentive to run faster has been severely weakened.

**Under the proposed system, weight reduction – one of the most important methods of cutting CO2 is severely penalised. A weight-based system reduces the number of compliance options open to car makers, and therefore makes for a less effective and / or more costly policy. This fundamentally goes against the principle of 'better regulation'.**

## Weight-based standards discriminate against petrol engines

Petrol engines are lighter than diesels, on average by about 50 kg. Under the Commission's proposal it would be more attractive for carmakers to further shift sales from petrol to diesel cars than to improve their petrol cars: the heavier, diesel car would give them 2 to 3 grammes extra CO2 bonus. That would have two negative consequences:

- More air pollution: even future Euro-6 compliant diesel cars are more polluting than petrol cars, particularly for emissions of nitrogen oxides (NO2)
- Energy security and trade balance: Europe's appetite for diesel has already led refineries to export petrol and import diesel. A weight-based system that favours diesels would reinforce this trend.

## Weight-based CO2 standards have implications for road safety

It is sometimes said that heavier cars are safer. That is not true. Studies have consistently shown up to four times higher levels of severe injury and death for pedestrians in collisions with SUVs. SUVs distinguish themselves from normal cars primarily through their additional weight and height, rather than a larger footprint. The Commission's proposed weight-based standards favour SUVs because they get more lenient standards than normal cars. A footprint-based system would treat SUVs and family cars of the same size roughly the same.

A report by Dynamic Research Inc. (DRI), which formed an important basis for new American fuel efficiency standards, showed that, if larger vehicles are safer for their occupants, it is not their weight but their size, more specifically their footprint (the area between the four wheels), that makes them safer. The summary of this report even states that "weight reduction would be expected to decrease the overall number of fatalities". It was primarily these safety concerns that persuaded the United States government to base new fuel economy standards for light trucks on footprint. In April 2008, the US announced that new car fuel economy standards would also be based on footprint.

## Weight-based standards have failed abroad

In the US, the weight-based CAFE fuel efficiency regulations have led to weight increases of 13 – 28 per cent since the 1970s when they were introduced. The US has opted for a footprint-based approach for future standards. In Japan, contrary to what the car industry says, weight-based fuel efficiency standards have failed to break the trend towards heavier vehicles. A boom in sales of *kei*-class cars, a special, ultra-mini class of car unique to Japan and exempt from certain parking restrictions, has disguised the trend towards heavier vehicles across all classes of car.<sup>3</sup>

<sup>2</sup> [http://ec.europa.eu/environment/co2/co2\\_home.htm](http://ec.europa.eu/environment/co2/co2_home.htm)

<sup>3</sup> The experience of both of these countries is further explained in an extended T&E briefing paper: [www.transportenvironment.org/Publications/prep\\_hand\\_out/lid:482](http://www.transportenvironment.org/Publications/prep_hand_out/lid:482)