



## Do CEE's Directives Really Compliance with the Kyoto Protocol? A Case Study: Fuel Consumption of one Toyota's "Little Genius"

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### Abstract

Developed Countries that signed the Kyoto Protocol are required to attain the established limits to the greenhouse gas (GHG) emissions or to pay penalty for the exceeding amount. In order to comply with the Protocol, CEE strategy is based on capillary information of fuel consumption of motor vehicles, to be done by producers, coupled to economic incentives to users in order to encourage ecological choices. The need to standardize the measure of GHG emission, related to the fuel consumption of a vehicle, allowed the drawing up of a very detailed procedure that includes the choice of driving simulation on urban and extra-urban cycles.

Many drivers claim that the difference between consumption of their own car and values declared by the producer is too high; tests performed by experts and published on trade journals such as Quattroruote (Italy) and Autobild (Germany), also demonstrate this datum; unfortunately nothing can be done to go against producers as such differences mainly depend on almost unrealistic car use simulations. Car producers fully respect the 98/69/CE [1] while the 1999/94/CE [2] is not so carefully followed. Moreover, the presented case study evidences that the board computer (BC), also currently equipping also small cars, furnishes false data aiming to convince driver of fuel consumption that is lower than the real one. Does this also happens on other cars? Is it correct that a consumer must pay an instrument to obtain misleading advertising?

### Introduction

As it is well known that the main source of GHG is linked to the use of motor vehicles, car producers (even if not involved in the emission trading foreseen in the Kyoto Protocol) have been engaged in the improvement of their motor's engineering. Unfortunately the satisfying results attained in this field are almost cancelled due to the continuous increase of citizens mobility, increase of selling of more powerful cars and continuous addition of "optionals" on cars such as air conditioning units.

The still open question is "who has to pay for the GHG emissions exceeding the cap, foreseen by the Protocol, caused by vehicles circulation?". This is a hard problem as it implies to knowing exactly "who" produces GHG and "how much" each responsible produces; anyway, surely the solution to this problem needs a qualitative and quantitative analysis of emissions produced by any source and than the need to establish a standardized "analytic iter". CE Directives on this topic, in my opinion, have a good approach based on capillary information but fails the aim due to the worst choice of the simulation used for the measures and therefore having wrong data Fig 1 actually shows that the urban cycle foresees a circulation at an high enough speed and low stop times (simulating red traffic light); on the contrary, taking into account that extra-urban cycle have to include circulation on high speed roads (130 km/h is the Italian limit and on some German roads there are no limits) speed values result really very low. Finally, acceleration values do not exceed the poor  $1.5 \text{ m/s}^2$  for both the two cycles and deceleration the  $-2.5 \text{ m/s}^2$ .

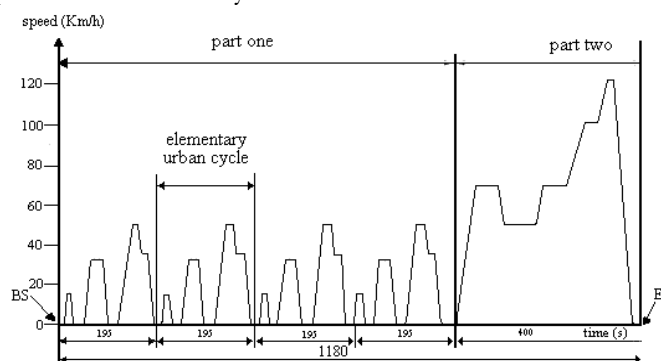


Fig. 1; test used to calculate GHG emissions [1]

## Materials & Methods

Toyota Yaris 1.0 (1KR-FE engine, designed by Daihatsu) seems to be an ideal city car due to its declared low fuel consumption due to its belonging in the Subcompact class (as defined by Euro NCAP). One such car, bought on February 2007 was monitored for about 15000 Km; in particular, the real consumption was calculated on each full reserve petrol's fill up and compared with those declared by the car's BC. Data on single routes were also acquired by the BC on about 2400 Km together with meteorological data and weight situation of the car.

## Results

Basing on the test foreseen by the CE Directive (fig 1) Toyota can declare for the Yaris 1.0 the following petrol consumption: 4.9, 5.4 and 6.4 L/100Km for extraurban, mixed and urban cycle respectively. Taking into account that the use of the monitored car fits at the best a mixed cycle, fuel consumptions declared by the car's BC (see blue bars in fig. 2, mean value  $6.2 \pm 0.5$ ) exceeds by about 15%. Moreover, a further 15% difference results between the calculated consumption (red bars in fig. 2, mean value  $7.0 \pm 0.6$ ) and those declared by the car's BC. As such difference is systematically lower, so being not statistical, this means that the algorithm used by the BC leads to a wanted or unwanted systematic error to be considered as direct (toward the car driver) and indirect (through a trustful user toward other possible purchasers) misleading advertising.

Data obtained in the monitoring of single routes demonstrates in all the cases a non correlation between consumption data and all the considered parameters; in particular, in spite of the definition wrote on the car manual, no correlation was found between the consumption variations and the decreasing trend of the remaining coverable way. Finally, values declared by the car's BC always resulted higher than the real covered way and must also be also considered misleading advertising. It could be contested that an error on the petrol fill must be considered but such kind of error surely should be statistical; moreover the positive error on fuel consumption

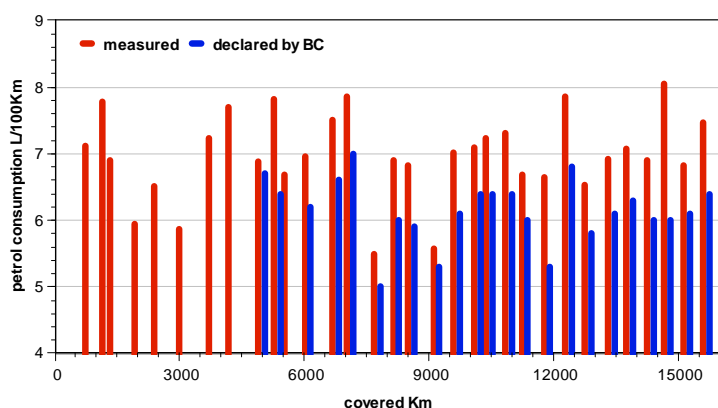


Fig. 2; Fuel consumptions of the monitored car

foresees an exceeding fill (mean value 3L/fill) while the always negative error on the evaluation of the coverable way requires a lack of fill ranging from 1.5 to 12 L/fill.

## Conclusions

The manifest conclusion is that the actual CE Directive doesn't ensure correct information to citizens about pollution that their own car produces. In particular, the test foreseen by the 98/69/CE Directive allows car

producers to declare emissions lower than

the real ones; this is due not only to a test not "on the road" but also to a science-fiction driving style simulation. Moreover, the 1999/94/CE Directive is not fully respected because in paper, to be put on car shown for sale, very often does not contain information that can be useful to advice about the possible real differences between declared and real values of fuel consumption (points 5 and 6 in the attachment I of the Directive). Finally, in the presented case study, the CB furnishes misleading data; is it a rare case? To my knowledge no control of the BC data is foreseen by law.

## References

- 1) 98/69/EC Directive 13-10-1998, EC's Official Gazette (IT) L 350/1, 28.12.98. Italian acknowledgement by DM 21 December 1999 published on the Italian Official Gazette n. 53, 04-03-2000, supplement
- 2) 1999/94/EC Directive 13-12-1999, EC's Official Gazette (IT) L 12/16, 18-01-2000. Italian acknowledgement by Dpr n.84, 17 February 2003