

Engine power limitation: A realistic option

**by Ir Gerard M.M. Alink, Ministry of Transport, Public Works and
Water Management, Holland**

1. SYNOPSIS

The political debate on the limitation of the power of engines in road transport has started. This paper presents some background and the political view on the possibilities of engine power limitations to reach the aims for emissions and road-safety.

2. ABSTRACT

This paper gives an political overview of possible measures to reach the European aims of fuel reduction and road safety. The following measures are suggested:

- (1) driver behavior: supported with econometers, cruise-control, etc.
- (2) new technologies: intelligent systems in motor management and the intelligent vehicle-road communication systems.
- (3) power reduction: todays engines are (very) over-powered. Fuel consumption may be reduced if we reduce the power to an acceptable level. In the Working Parties of the ECE and EC the discussion about this item has started.

The paper presents the political backgrounds of these measures and the way to reach the aims of safety and emissions.

3. INTRODUCTION

On 11 November 1991 the European Conference of Ministers of Transport (ECMT) adopted a resolution calling for the engine power of all road vehicles to be limited. The resolution was motivated by the desire to save energy and reduce harmful emissions, road traffic being one of the main polluters in the industrial world (IEA/OECD, 1992).

In recent years the governments of the EC member states have increasingly been confronted with serious levels of environmental pollution, involving emissions of harmful substances such as NO_x, SO₂ and aromatic hydrocarbons (C_xH_y) and of emissions of CO₂ (in itself harmless). To the emissions of CO₂ the greenhouse effect is linked.

In a number of countries policies are adopted to limit and ultimately reduce the emission of various substances. One of the important sources is transport, in the Netherlands responsible for about 55% of the emissions. In the Netherlands road traffic is the largest single source of air pollution and noise nuisance. It seems reasonable to suggest that a comparable situation exists in comparable, industrialised, countries.

In the recent past a number of measures have been taken to reduce emissions of road transport, one being the fiscal support for the catalytic convertor. Drawback of the catalyst is that although it reduces the emission of some substances dramatically, this positive result has to be "bought" with additional energy use meaning additional CO₂ emission.

The future of the policy of governments in the area of transport and environment will be directed at lower

emissions of all pollutants, reduction of energy use and enhancing of road safety. This policy goal can be translated in the term "a sustainable traffic system", i.e. a traffic system that will remain safe and environmentally friendly over a long period of time. (Green Paper, EC 1992)

European governments face a difficult choice in attaining this "sustainable national traffic system", main aspects being:

- a growing demand for transport. This has increased still further by changes in the EC (common market) and the changes in Eastern Europe.
- the national interests of countries, especially when national industries are not able to meet the more stringent standards set.

When it comes to a "sustainable" European transport policy, the mentioned aspects prevent this from really getting off the ground. A great deal of energy is being put into the definition of such a policy. (Transport Policy, EC 1993)

4. STRATEGY

It will be clear that the European environmental policy goes less far than several individual member states consider desirable. These member states sometimes take more radical measures in their own countries. One area where this is in principle possible is the transport policy. But here, too, are limitations (EC 1992).

One such a limitation is that although member states can introduce more stringent environmental standards, they are still bound by European directives. As a consequence they are not allowed to deny access to vehicles from other member states which meet EC standard. In addition, more stringent standards undermine competitiveness and this is at odds with national policy. The result is a vicious circle, which can only be broken by adopting a radical approach.

A radical approach can best be initiated by an individual member state. Proposals of the European Commission are necessarily a compromise, with greater emphasis on feasibility than on desirability. On the basis of an initiative of a member state the best chances exist for a far reaching compromise.

An example of such an initiative taken by a member state is council. Directive 92/24/EEC, adopted at the end of 1991, which requires speed limitation devices to be fitted to heavy lorries and coaches. The directive was supported by results of a pilot project involving speed limitation devices carried out by the Dutch authorities.

The groundwork for other measures could be laid in a similar manner. Use can be made of existing international channels in the field of transport research. An important body in this regard is COST, which coordinates transport research for both EC and EFTA members. Measures can be extended to the rest of the world via the ECE, an agency of the United Nations.

5. MEASURES

Energy saving and emissions reduction can be attained by a number of measures. A number of types of measures can be distinguished, being:

- (a) measures to reduce car use. A drastic approach could be the closing of public roads to (certain) vehicles, a less drastic measure could be the encouraging of car pooling the encouraging of different means of transport or by making the use of the car more difficult or expensive (tolls, expensive carparks, etc).

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- (b) measures to make the driver use his car more (fuel) efficient. This could be reached by:
- informing the driver about fuel use and costs;
 - modifying the infrastructure, so that lower speeds are attained;
- (c) technical means, aimed at energy saving, a.o.:
- driver behavior: influencing driver behavior with information systems and support systems, built in the car. Examples are the econometer, cruise-control and intelligent high way information systems;
 - new intelligent technologies, limiting the freedom of the driver in accelerating (intelligent motor management) and systems that take part in the control of the car (intelligent vehicle control systems);
 - power reduction: reducing the power of the engine to an acceptable level. Discussions on this topic have started, a.o. in the Working Parties of the ECE and EC.
- (d) measures to influence the choice of a car a.o., by fiscal measures. An attempt with such a measure has been made in the Netherlands, where cleaner cars were subsidised. For instance, the fitting of a catalytic convertor was subsidised, resulting in a large proportion of the vehicles in the Netherlands being fitted with such a device in a relatively short space of time. At present other fiscal measures for influencing the purchase and use of cars in a way that will reduce environmental pollution are vigorously being sought.

This special tax is being turned into an environmental tax based on fuel consumption and the cleanness of the engine: the higher the fuel consumption and the dirtier the engine, the higher the tax.

In addition, various ways of influencing use by means of fiscal measures are being studied, including tolls, rush hour stickers (extra must be paid for driving in the rush hours), higher fuel tax, and road pricing (a payment is made for each kilometre driven via a credit card system, the rate depending on the time of day). Another way of influencing the purchase of cars is by introducing an extra tax on engine power. This will kill two birds with one stone, since as well as influencing purchases, it will also encourage the production of more economical vehicles.

6. TECHNICAL MEANS, PERSPECTIVE

Above some technical means aimed at energy saving are mentioned. These technical means could in the long term mean that vehicles will no longer be able to travel faster than the statutory (European) speed limit. For local purposes, use will be made of road-vehicle communication techniques, and the desired speed will be set for each speed zone. To ensure that long journeys can proceed smoothly and flexibly, vehicles could be linked in some way so that they can travel at higher speeds. (Bingham 1990)

The introduction of a new type of vehicle, especially for urban traffic, must also be examined. Options are the electric car, which is currently being promoted, and the hybrid vehicle. Maybe cities should even be closed to car traffic. A choice must be made soon, especially since the necessary measures still have to be prepared and implemented (replacement of existing vehicles alone will take 10 years).

In the sort time the unrestrained increase in engine power need to be considered especially for passenger cars. Ten years ago an engine power of about 100 kW was considered very high, whereas nowadays passenger cars are being produced with engine powers of about 400 kW. Although a speed limitation device is fitted to these vehicles (set at about 250 km/h due to tyre quality), such an engine power is not in line with policy goals of this moment. For comparison: a passenger car of 400 kW carries 2,000 kg, while a lorry of 400 kW carries about 50,000 kg. (Kroon 1992)

Research by various institutes has shown that an engine power of about 10 kW is sufficient for an average passenger car at cruising speed (about 30 kW for acceleration and mountainous terrain). By using smaller engines, possibilities for savings in the weight of the vehicle exist. By using smaller capacity engines, lower internal energy losses can result. These developments lead to a more efficient use of fuel. (BMFT 1992) On the other hand, the performance of a car with lower power is not as good. Reduced performance levels should be accepted.

7. POLICY DEVELOPMENT, DEBATE

However, if we wish to take all the international environmental proposals seriously, this matter must at least be debated. The longer we ignore the problem the more serious it will become. The ECMT is the first body to take the plunge and has raised the issue in a resolution urging engine power to be limited. The resolution is currently being discussed by the ECE and EC. But the first step has been taken, however cautious it may be. I would therefore urge every expert in this field to adopt a clear position on this matter so that further debate can be conducted in a businesslike manner.

The way in which this aim is to be achieved is not yet clear. Possibilities include tax measures (see chapter 3.a.), but it is also possible to use physical measures. For instance, as is the case in parts of the USA, a country could decide that when importing a particular make of car, a certain average engine power must not be exceeded. Similar measures could also be used to force manufacturers to produce a greater number of small and light vehicles to compensate for the larger ones. Finally a ban could be introduced on vehicles with an engine power higher than an acceptable maximum. The latter measure would entail a radical intervention in company policies, especially that of producers of large vehicles with a high engine power. Nevertheless this option is being seriously considered because it offers the best guarantee for the attaining of the goal set.

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