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**CONCLUSIONS AND RECOMMENDATIONS ON SCRAPPAGE SCHEMES AND
THEIR ROLE IN IMPROVING THE ENVIRONMENTAL PERFORMANCE OF
THE CAR FLEET**

These Conclusions and Recommendations were agreed by the ECMT Council of Ministers on 19 and 20 May 1999 in Warsaw.

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CONCLUSIONS AND RECOMMENDATIONS ON SCRAPPAGE SCHEMES AND THEIR ROLE IN IMPROVING THE ENVIRONMENTAL PERFORMANCE OF THE CAR FLEET

Several countries within and outside Europe have implemented car scrappage schemes during the 1990s. Incentives for scrapping old cars were given by Greece (1991-1993), Hungary (1993 up to the present) Denmark (1994-1995), Spain (1994 up to the present), France (1994-1996), Ireland (1995-1997), Norway (1996) and Italy (1997-1998). Various local governments in the United States of America and the Canadian Province of British Columbia have also implemented such schemes.

All government and industry sponsored car scrappage schemes implemented to date put improvement of the environmental performance of the car fleet among their main goals. The present report attempts to assess car scrappage schemes mainly according to this criteria. It includes some additional analysis of the impact of scrappage schemes on vehicle manufacturing industry, on markets for other durable goods and on the benefits of improved vehicle safety. Surprisingly few of the scrappage schemes examined included a quantitative assessment of their impact on the environment or their cost effectiveness with regard to environmental protection. Most assessments were limited to the impact of schemes on the automobile manufacturing industry and in some cases on GDP and employment.

General conclusions

Scrappage schemes have two main possible impacts on the environment. The first is positive: they may reduce the load of atmospheric emissions caused by the car fleet since they substitute older, more polluting vehicles with newer, cleaner ones. The second is negative: they shorten the average car's life and, therefore, if the schemes are permanent or repeated over time, they increase the amount of energy and materials used and emissions caused by all the processes involved in car construction, dismantling, scrapping and recycling.

As the actual difference in environmental performance between some older vehicles and most newer ones is substantial, the positive effect is likely to prevail for most of the schemes implemented. Newer vehicles are also more durable and maintain design emissions levels over greater mileages than older vehicles. The increasing incorporation of on-board diagnostics, which should reduce the likelihood of new vehicles performing below design emissions standards as they age, is also a positive factor. Scrappage schemes are likely to involve substantial reductions in emissions per km driven of hydrocarbons and carbon monoxide in particular. To a more limited extent, they may also reduce NO_x emissions. The effects of scrappage schemes on greenhouse gas emissions are very uncertain, however, and may even be negative (i.e. they might increase the overall amount of CO₂ emitted). The sign and size of changes in CO₂ emissions will greatly depend on the detailed design of the schemes. Reductions in specific emissions of all kinds may also be partially off-set by rebound effects — consumers benefiting from cash-for-replacement schemes may take the opportunity to purchase a more powerful car and use the new vehicle more intensively.

The emission reduction achieved by *temporary* schemes will itself be temporary and the improvement achieved short-lived. The natural renewal rate of the fleet, without any incentives, would replace the same old vehicles in any case some two or three years later.

The possible gains from *permanent* scrappage schemes rely on improvements in average emissions from new generations of vehicles and engines. Scrappage programmes will achieve net environmental benefits only if *future* vehicles have emission rates substantially better than older models *and* if, at the same time, the environmental impact of vehicle construction and dismantling processes is reduced. The introduction of three-way catalytic converters resulted in significant reductions in specific emissions but technological improvements since then have resulted in only more modest reductions. The window of opportunity for achieving large benefits from scrappage schemes is therefore narrowing, as an increasing part of the existing fleet comprises vehicles equipped with catalysers. Some new technological breakthrough, for example one that reduces cold-start emissions, could alter this trend if commercialised in the future.

Assessments of scrappage schemes cannot be made only on the basis of emission standards or average emission factors for different model years, but depend on economic variables affecting the behaviour of car owners and on the cost of the scheme. Where the cost per tonne of pollutant reduced is high, other environmental policy measures should be considered instead of scrappage programmes. The structure of taxation in relation to the ownership and use of vehicles is a key element in determining the overall economic incentive for vehicle stock turnover. The cost-effectiveness of scrappage schemes may be undermined if they run counter to incentives arising from the existing structure of taxation (for example, if older vehicles pay lower annual vehicle charges than new cars).

Both the size of the emission reduction achieved and cost-effectiveness depend heavily on the detailed design of scrappage programmes.

Some lessons from the different types of programme implemented to date

Two broad groups of scrappage schemes have been identified. Under the first kind, cash-for-scrappage, incentives are available *whatever the subsequent replacement decision* taken by the consumer. The second type of scheme, cash-for-replacement, provides an incentive payment that is *conditional* upon a specific kind of replacement vehicle being chosen (typically, but not necessarily, a new-model car).

When the selection of vehicles to be retired is made carefully, cash-for-scrappage schemes may achieve useful emission reductions at a reasonable cost, i.e. at a cost comparable to the main alternatives for reducing fleet emissions.

The number of vehicles retired by either type of scheme should not, however, go beyond a *limited number* of vehicles selected among the 'gross emitters' in the fleet. Otherwise the cost per tonne of emissions avoided increases considerably. Moreover, by bringing forward a large number of scrappage and replacement decisions, the schemes may cause considerable perturbations on the car market.

The cash-for-replacement schemes implemented up to the present time appear to have been much less cost-effective. In most cases, they constrained the consumer to purchase a new car. In doing so, they have excluded lower-income groups who cannot afford to purchase new cars even with an incentive bonus. This makes the schemes somewhat inequitable, but more importantly prevents them from attracting many of the oldest cars in the fleet, used typically by lower-income families, intensively, as their principal means of transport. These schemes, therefore, have *not* properly selected the vehicles to be retired, leaving in use a large proportion of the 'gross emitters'. Moreover, higher payments are necessary to influence the decision to purchase a new car, rather than simply scrap a car (which might be replaced with a used car or not replaced at all). As a consequence, these schemes have a high average cost

per tonne of pollution avoided and they do not compare favourably with other alternative policy tools on purely environmental grounds.

Timing is important. The available data suggest that the average fuel consumption of European new-model cars was higher in the early 1990s than during the second half of the 1980s. This implies that some of the cash-for-replacement schemes implemented in the early 1990s may have resulted in an *increase* in total CO₂ emissions. On the other hand, these schemes increased the percentage of small vehicles in total first registrations. This might have counterbalanced the increase in fuel consumption of the average car. The net effect on CO₂ emissions was of uncertain size and sign. Since the early 1990s, average CO₂ emissions from new cars have fallen back to near the low point recorded in the mid-1980s in most countries.

Cash-for-replacement schemes might have positive economic effects on the country that introduces them, particularly if it has a significant national car industry. The increase in new car sales might bring about an increase in GDP and employment. However, this increase will again be of only a temporary, short-term nature. It will also probably have some negative counter effects. First, it will involve a fall in sales following the end of the scheme and possibly just before a scheme is introduced and second, increased expenditure on cars will subtract from available income for purchases of other durable goods. The overall change in GDP and employment resulting from these effects is difficult to assess. Macroeconomic analysis is required and this should evaluate schemes over the mid to long term, extending the time frame beyond the simple positive short-term effect on car sales.

The possible uses of scrappage schemes in former socialist countries

Most Central and Eastern European countries are currently experiencing steady growth in their car fleets with average growth rates considerably higher than in most West European countries. This means first of all, that during the current phase, most first-registrations in these countries do not concern the *replacement* of existing old vehicles. Instead they represent net additions to the fleet. As scrappage schemes aim to influence replacement decisions, their role - both in economic and environmental terms - will be more limited, compared to schemes introduced in Western economies.

On the other hand, although the Eastern fleets are rapidly changing in both quantitative and qualitative terms, there remain a rather large number of older cars manufactured in former socialist countries, whose environmental and safety performances are poor. Because of this, there may still be a potential role for instruments that accelerate vehicle retirement.

Income constraints make cash-for-replacement schemes particularly difficult to design successfully in the newer member countries. 'Gross emitters' are typically run by households on the lowest incomes, and the cost of a new car represents an even higher proportion of income for this segment than in Western Europe. There may be opportunities to introduce cash-for-replacement schemes for commercial and public vehicles. Enterprises, unlike households, have the financial capacity and longer-term planning horizons to make use of relatively small cash incentives, tax credits or depreciation allowances. Moreover, trucks and busses typically contribute an extremely large share of total fleet emissions in the early stages of fleet growth and economic restructuring.

Before targeting an acceleration of fleet renewal, the government of any country must ensure that the fundamental set of transport and environmental policies regulating emissions are already effectively implemented and enforced. These include an adequate framework of legislative and economic instruments including registration documentation, fully implemented emissions regulations and their

effective enforcement through pre-sales testing and after sales inspection and maintenance. Not all of the former socialist countries fulfil this condition. In Russia, for instance, inadequacies include emissions regulations that are not always enforced in manufacturing and insufficient inspection and maintenance capacities. Overall, there is a major failure to enforce environmental regulations. For countries such as Russia, incentives for accelerated vehicle retirement might become useful at some later stage after the fundamentals have been addressed, when they might be applied to specific urban areas with higher than average levels of motorisation.

Other policy tools

The specific aim of this report is to assess scrappage schemes. Other possible instruments for improving fleet environmental characteristics have been mentioned but not analysed. This does not mean that they are considered less useful. On the contrary, effective emissions control policies are prerequisite to the introduction of scrappage schemes. It was possible to implement the programmes evaluated only because of emissions regulations, which over the last twenty years have considerably reduced emissions from new cars and consequently significantly improved the average environmental performance of the fleet.

At least three different policy tools provide alternatives to scrappage schemes — in the sense that they may bring about the same qualitative changes in environmental impact. In some cases, they may also even result in an increase in first registrations.

First, scrappage incentives are ultimately just a way to change the relative prices of older cars with respect to newer models. The same effect may be obtained, in a permanent way, by changing the structure of annual vehicle taxation. German experience suggests that changing the structure of taxation to tax older cars more heavily than new ones, on the basis of emissions characteristics, can accelerate considerably the replacement of older cars with cleaner vehicles.

Second, an enhancement of inspection and maintenance programmes (in particular as concerns environmental requirements) can also render the operation of older cars more costly and will therefore encourage their replacement. Enhancing inspection and maintenance programmes may be particularly attractive because this approach leaves the owner of a vehicle that has failed an inspection to choose between replacing the car or repairing it, without changing relative market prices directly.

A final option that is worth considering before implementing a scrappage scheme is retrofitting. Retrofitting vehicles with catalysers or other emissions control systems or converting engines to run on alternative fuels can in some circumstances be more cost-effective than replacement. The potential safety benefit of replacement is, however, forgone.