This document was noted by Ministers at their Session in Prague on 30-31 May 2000.

Conference papers can be consulted on the ECMT website:
http://www.oecd.org/CEM/topics/env/CO2turin.htm
SMART CO₂ REDUCTIONS

CONFERENCE CONCLUSIONS — TURIN 2-3 MARCH 2000

1 Much of the accent on reducing CO₂ from road transport has focused on measures to limit emissions from new cars. The conference provided a valuable opportunity to review complementary policy areas. It examined the practical and policy issues and the potential from measures which focus on vehicles in use (often called non product measures) to reduce CO₂ emissions.

2 The attendance of three transport Ministers (Mr Peltram of the Czech Republic and current President of ECMT, Mr Bersani of Italy and Mr Leuenberger of Switzerland) at the opening session, as well as the Chairmen of ACEA (Mr Cantarella) and OICA (Mr di Camillo) and Mr Salvarani, representing European Commissioner Ms de Palacio, underlined the importance of a number of political points. First, the intention of Governments to attain Kyoto targets, second the concern of transport Ministers that the sector would make its full contribution to these reductions and third the commitment to working together to achieve the targets.

Indeed Mr Cantarella, reported that the ACEA-European Union voluntary agreement is already producing creditable results. Between 1995 and 1999 the average CO₂ emissions from ACEA’s new cars fell by over 6%, in line with the 2003 indicative range and with overall achievement of the commitment. This is designed to contribute 15% of the overall emissions reductions required to meet the Union’s Kyoto target. Mr Cantarella made a strong plea to continue with the voluntary approach in this and related areas.

The introductory session also confirmed that so far in most countries relatively little consideration had been given to non-product measures, which nevertheless have a large potential for reducing CO₂ emissions relatively quickly and cheaply. Given the effectiveness of the non-product measures reviewed, the conference sought to address why more emphasis has not been placed on them in addressing climate change and asked how the focus can be shifted to them in the future.

3 The most important potential lies in improving driver behaviour. The opening paper showed that up to 15% reductions have been shown to be possible in practice with a good driving style. The figure includes some allowance for the inevitable drop in performance as a trained driver partially reverts to old habits. A good driving style involves avoiding aggressive accelerations and braking, changing gears early (at about 2000 revs) and getting into top gear as soon as possible. Most drivers do not understand modern engines and wrongly believe that changing gears at low revs is bad for the engine. Modern engines are designed to produce power at low revs. Technology has advanced, drivers have not. Indeed modern automatic gear boxes change gears at the fuel efficient point (even in ‘sport mode’). Not revving engines when they are started is very important. Switching off the engine whenever stationary for over a minute yields further net fuel savings. Stop-go driving with frequent gear changes is typical of urban driving conditions, so there is a big potential for CO₂ emissions reductions in urban areas.

It was suggested that driver training should include specific instruction on fuel-efficient driving. This should become part of all learner driver programmes, with some relevant questions included in the driving test. One of the difficulties is maintaining in practice the improvements training can bring. Feedback from the vehicle can help, either through information from on board econometers or computers or through
automatic speed control devices. The simplest and cheapest device of all is to mark rev counters with a green band between 1500 and 2500 revs.

Cars with automatic gearboxes change gear in an ideally fuel efficient manner. Automatics are, however, accorded higher fuel consumption on the standard EU test cycles than equivalent manual models. It could be that in actual driving conditions, modern automatics emit less CO₂ than manual models. If research confirms this, proper account should be taken of the anomaly in vehicle efficiency labelling schemes and possibly in other incentive schemes.

4. The contribution on **driver attitudes** from the Automobile Clubs association (AIT/FIA) showed that environmental concern amongst the general public was often rather general and not concretely linked to driving behaviour. While there was discussion about the real likelihood of achieving the full potential savings from better driving it was evident that all stakeholders can contribute. The car industry can explain to drivers in handbooks and other material how to drive more fuel efficiently (some already do). Dealers, traders and associations of car drivers can do likewise. Governments too can run publicity campaigns with the organisational support of the other stakeholders. The success of drinking and driving campaigns in fundamentally changing attitudes in most countries demonstrates what is possible with such campaigns and also demonstrates the perseverance necessary and the need to vary the message over time to avoid boring or alienating the public. Though to make a lasting impact on driving style a half day training session on the road or on a simulator is most effective. The presentation also expressed interest in the CO₂ reduction potential offered by intelligent speed adaptation systems being developed to improve safety. The one area ranked highest in surveys of driver concerns is bad behaviour from other drivers — inappropriate speed, aggressive and dangerous driving. Improvement in such behaviour is likely to have spin-offs for cutting emissions and there appears to be a potential for tapping into this concern for influencing driving style. Overall improved driver behaviour is an area with a very substantial uncaptured potential.

5. In terms of **concrete achievements**, success stories in the UK were reviewed of efforts to convince motorists of the possibilities of greener more fuel-efficient motoring. The accent was on achieving gradual change, on evolution rather than revolution. Certainly there are lessons there for other countries on how the industry can proactively contribute to reducing CO₂ emissions, particularly through communications strategies and awareness building.

6. The paper on **vehicle maintenance** underlined its importance. Significant CO₂ emissions reductions can be obtained from regular maintenance. Reductions in noxious pollutants and better safety performance are also obtained. For all but the newest cars — for which owners have an incentive for maintaining the value of the vehicle — international experience shows that adequate maintenance can only be ensured by regular compulsory inspections and control. Older vehicles tend to be driven by lower income, particularly younger drivers, who are unlikely to pay for regular, quality maintenance on a voluntary basis. The expert view is that compulsory inspections should begin after four years, followed by a two-year gap and then annual inspections. This suggests a modification to the relevant EU Directive (96/96/EC). There is a strong need to ensure inspections take place through enforcement measures since many owners will try to avoid them. These could include a link to the annual tax certificate (as in the UK) or a system of windscreen stickers (as in the Czech Republic) so that traffic police can see a vehicle is up to date on maintenance requirements even when it is parked.

7. The session on **vehicle park renewal** schemes showed also some potential to reduce fuel consumption. Quantification is difficult in respect of CO₂. The trade-off between CO₂ emissions from cars and in the manufacturing of vehicles needs to be considered. Emission reduction benefits are clearer for traditional pollutants. The age of the vehicle, the intensity of its actual use and the type of replacement vehicle all play a role in determining the overall benefits from scrappage and replacement incentive schemes. The paper on good design of such schemes emphasised how essential it is to target the relatively
small number of gross emitters in the fleet and even to focus on urban areas. For purely CO\textsubscript{2} emissions reductions, incentives for scrappage without replacement present clearer gains than incentives to buy a replacement car. The most difficult area of all to assess is the impact of incentives on the relative values of second hand and new cars which can seriously perturb markets when a large number of vehicles are targeted.

Incentives for scrappage and replacement can also be considered for buses. Major improvements in vehicle fuel efficiency over the last two decades coupled with the advanced average age of bus fleets in many European cities suggest a potential for cost-effective incentive schemes. The potential varies with location: the average age of busses and coaches in the EU is estimated at 7 years, whilst in Italy it is 11-12 years. Such old fleets are associated with high maintenance costs with frequent non-availability of vehicles. Bus companies thus have an existing financial incentive to replace vehicles but may lack the capital to make the necessary investments. Small capital grants can thus have large leverage.

8. The paper on structural fiscal incentives in Germany showed clearly that these incentives work. The examples of unleaded fuel and the rapid catalysation of the fleet as areas where the incentives had allowed a rapid introduction of new technology ahead of regulatory requirements. The case was put for introducing similar incentives, linked to a future regulatory standard, for accelerating the distribution of sufficiently low sulphur fuels to allow lean burn engines to contribute to reducing CO\textsubscript{2} emissions (these require advanced de-NOx exhaust treatment that is ineffective in the presence of sulphuric acid). Incentives for the purchase of cars with conventional fuel efficient engines have been introduced in Germany although it is too early to quantify their effectiveness.

Such incentives give clear signals to the wallets of consumers but can be made revenue neutral and therefore need not increase the overall taxation burden on the motorist. While there was general acceptance of this approach — differentiating vehicle taxes on the basis of fuel consumption performance — there was criticism of the idea of further raising fuel taxes as a way of providing incentives to reduce CO\textsubscript{2} emissions. This was partly because it was argued that they do not seem to be effective in reducing fuel consumption because most motorists do not have much choice as to whether or how much they use their cars and partly because of political opposition. The political costs of relying on fuel taxes to provide incentives for cutting CO\textsubscript{2} emissions was illustrated by the recent decision to halt the fuel price escalator in the UK. Obviously discussion on this topic will continue.

The international automobile clubs speaker suggested that a “huge” discount is appropriate to encourage purchase of vehicles that meet the 2005 Euro 4 standards early and similarly large scrapping incentives are appropriate, designed specifically to promote environmental protection rather than assist the car industry maintain sales as previous European schemes had done.

9. New information technology has the potential to reduce or eliminate many of the inefficiencies in the transport system. These benefits could result in smoothing traffic flows, cutting unnecessary driving in looking for parking spaces and providing route guidance to avoid congestion which can all bring benefits in cutting fuel consumption. The anticipated explosion in portable internet services through mobile phones should make such IT applications much more widespread. While there are a number of concrete examples (traffic master in UK, Visionaute in France) the difficulty still lies in quantifying the potential benefits. There is also the risk of rebound effects, in that the capacity improvements that new technology allows might be taken up in the form of extra demand. Nevertheless it is clear that work must continue in order to capture the potential benefits from these systems.

10. The Turin 5T project — a partnership between the city government, city transport authority, transport research institute, telematic system providers and vehicle manufacturers — provides a good example of how information technology can be exploited successfully to produce emissions reductions in
practice. The first stage of the project — restricted to the central area of the city — achieved 10-11% \( CO_2 \) emissions reductions according to the modelling efforts of the transport institute and resulted in a 21% measured improvement in a set of monitored origin to destination journey times into and across the city centre. The key was in adopting an integrated approach that added to and linked existing systems, without requiring their replacement. Five main systems were linked to real time monitoring and modelling of traffic flow: traffic light control; bus location and radio communications; variable message road signs displaying recommended routes and congested areas to avoid; off street parking automatic monitoring and fee collection; variable message signs at bus stops displaying waiting time until arrival of next bus. The system was developed as part of an overall policy to increase use of the city’s busses and trams and reduce car trips and to exclude some classes of vehicles from a zone in the city centre and shift from provision of on-street parking to off-street parking. The greatest part of the gains achieved are believed to have come from the intelligent co-ordination of all the elements of the system with the control software and the traffic model at the heart of the project. The scheme will be extended to the whole city once financing can be secured, and other examples of integrated projects are being developed by some of the partners, notably in Naples (ATENA project) where methane and hybrid vehicles are part of the system.

11. Assessing the adequacy of infrastructure is complex, as the presentation on this issue showed. Differentiation must be made between the urban and interurban case, between road and rail and between different groups of users. The volume of mobility is not the sole determinant of \( CO_2 \) emissions: distance travelled per trip, load factor and occupancy rates currently add up to be more important than number of trips. Two areas where \( CO_2 \) savings could be made were underlined. The first relates to urban sprawl where the continued expansion of urban areas is generating longer trips and therefore higher emissions. Limiting urban expansion could be beneficial. The second concerns urban freight where infrastructure and vehicles seem to be used inefficiently at present. While new or expanded infrastructure is needed in particular cases where there are severe bottlenecks, a substantial effort is needed to use existing infrastructure better. Economic instruments are important here but must be designed to have an impact on behaviour — targeting areas where there is choice — otherwise they simply become income tax equivalents. The speaker from the French national transport research institute, INRETS, emphasised that thorough quantitative analysis at a sufficiently disaggregated level to reflect real differences in behaviour between different categories of driver is required to design effective policy measures. It is not sufficient, for example, to restrict analysis to the very general level of price elasticity for passenger car transport as a whole or for freight transport as a whole.

12. As an example of the potential foreseen for non-product approaches to reducing \( CO_2 \) emissions from vehicles at national level, the Netherlands current plans were reviewed. Details are given in the accompanying table. About half to two thirds of the expected savings should come from non-product measures, depending on how the calculation is made (see footnote to table). The gains from simple measures were emphasised, like higher tyre pressure, which costs nothing and can reduce fuel consumption 5% and brings other benefits in terms of safety and reduced costs to the motorist from tyre wear. Enforcement of speed limits too could bring gains and the Dutch Government is committing more resources to enforcement and launching experiments with in-car equipment to help the driver respect limits and drive at lower engine revs. An important distinction was drawn between measures to address \( CO_2 \) emissions and measures to reduce congestion. The benefits of measures that are eventually successful in reducing congestion will be felt by a different constituency from those that benefit from reductions in \( CO_2 \) emissions. For congestion it is a well defined group of users of a specific road whilst for \( CO_2 \) it is the global population. This has important consequences for the types of measures that can be employed and are likely to be accepted. For example, the road tolling schemes about to be introduced in the Netherlands are designed to manage congestion, not \( CO_2 \). Any \( CO_2 \) emissions reductions will be incidental to the design purpose of road tolling.
Dutch Climate Policy Implementation Plan: Measures in the Traffic Sector

<table>
<thead>
<tr>
<th>Measure</th>
<th>CO₂ reductions 1997-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACEA voluntary agreement</td>
<td>0.4 Mt*</td>
</tr>
<tr>
<td>N₂O emissions regulations</td>
<td>0.5 Mt</td>
</tr>
<tr>
<td>Tax incentives for fuel efficient cars with fuel efficiency labelling for new cars</td>
<td>0.6 Mt</td>
</tr>
<tr>
<td>Road pricing side-effect</td>
<td>0.2 Mt</td>
</tr>
<tr>
<td>Tax measures to reduce commuting and company car traffic</td>
<td>0.1—0.3 Mt</td>
</tr>
<tr>
<td>Tax incentives and agreements with car importers for standard equipment on new cars with instruments to monitor fuel-efficient driving</td>
<td>0.5 Mt</td>
</tr>
<tr>
<td>Raising and better controlling tyre pressure</td>
<td>0.3 Mt</td>
</tr>
<tr>
<td>Training, demonstration &amp; publicity projects for better logistics, driver behaviour etc</td>
<td>0.2—0.3 Mt</td>
</tr>
<tr>
<td>Stepped up speed limit enforcement (doubling policing)</td>
<td>0.3 Mt</td>
</tr>
<tr>
<td>Total</td>
<td>2.7—3.4 Mt</td>
</tr>
</tbody>
</table>

* Figure as published, now being revised upwards. The ACEA agreement equates to an estimated 3 Mt plus of CO₂ emissions reductions in the Netherlands on the basis of a rough breakdown of the 85 Mt reductions the European Commission expects from the agreement across the Union.

Source: Ministry of Housing, Spatial Planning and the Environment, July 1999.

13. **In summary** the conference showed clearly that non-product measures have very significant potential to deliver CO₂ reductions, and deliver them quickly and often cheaply. There remain difficulties in quantifying the potential of some measures, particularly vehicle scrappage and replacement incentives, which means care must be taken in assessing cost effectiveness. Improved driver behaviour, better vehicle maintenance and higher tyre pressures were identified as clear areas where reductions can be achieved very cost effectively.

National authorities are best placed to take the lead in ensuring regular and high standard maintenance of vehicles and in organising public relations campaigns for more responsible driver behaviour. Vehicle manufacturers can influence tyre pressure by changing handbooks and vehicle labelling to prescribe higher pressures for normal conditions, as well as for high loads and motorway driving. Garages are well placed to back this up through frequent checking of tyre pressure. Vehicle manufacturers and distributors are clearly well placed to equip cars with devices to provide feedback on driving style: low cost econometers at the bottom end of the range; cruise control for typically high mileage cars such as company cars and diesels; and no-cost green bands to highlight the 1 500—2 500 area on rev counters for all new model cars. The value of voluntary agreements between manufacturers and governments has been clearly demonstrated and there may be a role for further agreements, especially in respect of light duty commercial vehicles.

New technology has undoubted potential. Even if global investment priorities and financing sources remain uncertain the 5T project demonstrates the power of integrated intelligent traffic control systems and the way in which they can improve the quality of service and ridership on public transport. Significant CO₂ emissions reductions have been demonstrated even at the pilot stage. Links to infrastructure expansion are complex and the impact of investments in expanded capacity on CO₂ emissions depends on circumstances. To put in place a strategy to reduce emissions requires that the technological, economic and institutional frameworks all pull in the same direction.

The experience presented by the UK Society of Motor Manufacturers and Traders and the plans of the Dutch Government show that attention is now turning to “smart” non-product measures, at least in some countries. The Italian examples presented highlighted the importance of integrated urban traffic management to reducing CO₂ emissions, even if its prime motivation is reducing congestion and local air pollution. A long term effort in persuasion through advertising and other communications tools will be
required to change driving habits but experience, for example with seat belts and drink-driving campaigns suggests change is possible. Money might be better spent in promoting better driving, and providing training, than on some of the current EU and national public relations exercises in relation to transport and the environment. There is a need to get all stakeholders committed to working towards the objective and the conference demonstrated the commitment of manufacturing industry, the motoring services industry, automobile associations and governments to work together to make smart CO₂ emissions reductions measures fulfil their potential.