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**ENVIRONMENTAL ASPECTS OF  
THE MOTOR VEHICLE AND ITS USE**

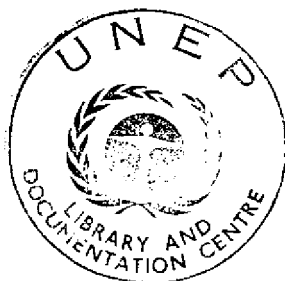
**- an overview -**



**UNITED NATIONS ENVIRONMENT PROGRAMME**

**ENVIRONMENTAL ASPECTS OF  
THE MOTOR VEHICLE AND ITS USE**

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## INTRODUCTION

It is generally recognised that the motor vehicle in its various forms - cars, buses, trucks, motorcycles and mopeds - makes a significant contribution to society throughout the world, because of the exceptional mobility it provides and the vital part it plays in economic growth in every sector of activity. It also contributes to the overall development of the less privileged members of the world community in at least two ways - it improves access and transport facilities and it creates a wide range of employment opportunities.

Conversely, it is also recognised that the increase in the number of motor vehicles, especially in urban areas without adequate infrastructures, is associated with certain negative environmental impacts, such as air pollution, noise, traffic congestion and accidents, adversely affecting certain aspects of the quality of life. There are, of course, other phenomena in the urban setting that bring social and economic benefits while at the same time impairing the quality of life (air pollution from stationary sources is an example) and it is vital to take a balanced view in each case. In this booklet, however, we are dealing specifically with the motor vehicle.

Although no way has yet been found of quantifying the motor vehicle's undoubted benefits or its disadvantages, including social aspects and costs, this booklet, which is based on the material collected together for the UNEP Motor Vehicle Seminar, attempts to set out for decision-makers the various issues regarding the environmental impact of the motor vehicle and to provide guidance on optimum motor vehicle use and manufacturing processes from the environmental standpoint.

### 1. URBAN ENVIRONMENTAL PLANNING AND TRANSPORT

There is no denying the fact that the passenger car plays an important part in the efficient performance of business and social activities. That having been said, however, since the main problems stemming from motor vehicle use arise in urban areas, it is obvious today that without close co-operation between the various authorities responsible for environmental protection, urban planning and transportation at national and local level, there can be no real improvement in the quality of the environment in terms of motor vehicle use.

As far as possible, urban growth should be controlled and optimised from the viewpoint of the quality of life. Overconcentration of housing or jobs should be avoided and maximum complementarity maintained between the need for intercommunication and the best use of scarce and costly resources. At the same time land-use planning should play its part by ensuring

that essential personal trips, such as those to work and school, are minimised in number and length. Road infrastructures should be designed or modernised to create smooth traffic flow and to bring about conditions which limit emissions of air pollutants and noise, reduce road accidents and waste less energy. There is a need for investment in well-planned and integrated transport systems (where not already in existence), due consideration being given to the complementary roles of the car and public transport, and the need to reconcile the overall interests of the community with personal freedom of choice. Public transport should be safe, comfortable and convenient, with adequate network density, accessible to everyone in the community, including its less-privileged members, and with routes, frequencies and speeds tailored to local requirements. Where necessary, adequate facilities should be provided for the private motorist, including sufficient offstreet parking capacity and ring roads for through traffic. The disabled should be especially catered for and their vehicles allowed access to all public areas.

Where appropriate, the provision of mixed transportation systems should be considered, e.g. bicycle - train - rapid transit, or car - bus with the necessary parking facilities.

Segregated pedestrian ways, areas served by public transport but with restricted access to other traffic plus peripheral parking facilities, and paths reserved for cycle traffic in areas with favourable climates, should all be encouraged in large towns and included in new urban and transport planning schemes.

## 2. VEHICLE DESIGN AND ENVIRONMENTAL PROTECTION

It is, of course, essential that the effects of legislation emission and safety standards be evaluated from time to time as existing vehicles are replaced by new ones meeting those standards, but apart from this, priority should be given to improvements in motor vehicle design aimed at minimising the impact of the motor vehicle on the environment in terms of air pollution and noise and at improving its safety characteristics and fuel economy. On the other hand, it is important that scarce and costly resources be used as efficiently as possible in the manufacturing process and these various requirements may, in some cases, conflict. For instance, data is still lacking regarding particulate emissions from diesel-powered vehicles. Neither do we know for certain what effect compliance with the most stringent air pollution control regulations now in force or envisaged in certain countries (e.g. for CO, HC and particularly NO<sub>x</sub>) will have on fuel consumption. Again, although reducing the lead content of gasoline admittedly increases fuel consumption, its impact on the whole chain of energy consumption, from refinery to motor vehicle, needs to be better known.

Authorities should therefore actively support R & D on vehicle design, the object being to reconcile conflicting requirements and to improve technologies to give maximum overall cost-effectiveness and the best balance of costs and benefits. For this it is important that they consult with industry and the relevant international organisations (e.g. UN/ECE WP 29), with a view to establishing priorities among these conflicting objectives.

**a) In the short term**, this means that industry and research institutes should continue their efforts in the following fields, either singly or in combination :

- Emission control, including the effect and durability of various systems (oxidation and three-way catalyst equipment, fuel metering systems, lead traps, EGR, air/fuel metering system, etc.).
- Noise abatement, the motor vehicle being considered both as a single source (particularly motor cycles and heavy diesel engine trucks) and as a contributor to total traffic noise in day-to-day urban conditions and on the open highway.
- Energy conservation through improved thermodynamic efficiency, lighter vehicle design (achieved both by reducing vehicle size and using lighter materials), reduced aerodynamic drag, more efficient transmission, tyres with less rolling resistance, and so forth.
- Raw material conservation through the use of lighter and more plentiful materials with recyclability and maintainability in mind, and through closer contact between vehicle manufacturers and the recycling industry, so as to improve awareness of the fast-changing situation as regards shredding equipment and recycling techniques.
- Improvement in vehicle safety performance in terms of accident prevention and the protection of vehicle occupants, cyclists and pedestrians, based on the best available in-depth accident statistics and biomechanical data.
- The increased use of alternative fuels, such as ethanol and methanol, either in replacement of or in addition to gasoline should also be considered. Although any large-scale use of alcohol blending is out of the question in the immediate future, there could be social and economic benefits in its use in certain countries, particularly where it can be produced from crops grown on land that would not otherwise be cultivated. Where blending is used, quality standards should be set by Authorities, so that engine design may be appropriately modified or adjusted. Subject to minor vehicle and engine design modifications, liquefied natural gas (LNG) and liquefied petroleum gas (LPG), both of which emit less pollution, can also be used as motor fuels.
- More generally, fuel policies should review the use made of liquid fuels and rationalize requirements by establishing the most cost-effective fuel/application relationships.

**b) In the longer term :**

- Support should be given to the continuance of R & D on advanced or new power plant designs that pollute less but maintain or improve present levels of thermodynamic efficiency. Illustrations are the Otto cycle engine offering improved combustion, induction and ignition (the lean burn and low thermal inertia engine, advanced injection, the sonic and ultra-sonic carburettor, stratified charge, etc.), and possibly, in the long term, new types of internal and external combustion engines (based, for example, on the Brayton, Stirling and Rankine cycles now under development, or on electricity storage systems). Because of the high cost of research in these fields, Authorities may have an important part to play in providing financial assistance when required and in arranging the necessary co-ordination, at national and international level, between industry, university and the various organisations concerned, as is already the case in some countries.
- Since hydrogen could be one of the main sources for generating energy, more encouragement should be given to its development as an alternative fuel for spark ignition engines, specific consideration being given to the problem of its storage either as compressed gas or in the form of a hybrid metal with exothermic characteristics.

### **3. REGULATIONS REGARDING THE MOTOR VEHICLE AND ITS USE – PROBLEMS RELATED TO THEIR INTERNATIONAL HARMONIZATION**

Control regulations constitute one of the instruments that Authorities can use to minimize the environmental impact (e.g. noise and air pollution) of the motor vehicle and stationary sources, to reduce road accidents and to provide better protection for vehicle occupants, cyclists and pedestrians.

#### **3.1. Air Pollution Control**

- a) In framing emission control regulations, decision-makers need to take into consideration, for each region, the relative shares of responsibility of motor vehicles and other sources, the ambient concentrations of the various pollutants, the geography of the region, the meteorological conditions in which pollutants are likely to disperse or to react (in certain conditions, for example, hydrocarbons and nitrogen oxides react in the atmosphere to give photochemical oxidant air pollution), and reliable dose-effect relationships for the various pollutants on their own and in combination. On this latter subject, the attention of Authorities is drawn to the work of the World Health Organization (WHO) and its evaluations of dose-effect relationships for carbon monoxide, hydrocarbons including

polycyclic aromatic hydrocarbons, nitrogen oxides, sulphur compounds, photochemical oxidants, lead and related substances (cf. "Air Quality Criteria and Guides for Urban Air Pollutants", WHO Technical Series No. 506). It must be possible for industry to be in no doubt, when regulations are put into effect, that due consideration has been given to the need for them and their technical feasibility. Industry must be informed about the standards that are required of their products, and be given a reasonable lead time for achieving targets or meeting standards in the most cost-effective way and without interfering with other environmental goals, such as overall energy conservation, vehicle maintainability, and so on. Care must be taken to see that legislation does not tend to encourage short-term fixes instead of stimulating long-range technology for abating air pollution, and more general improvements in energy consumption and reliability. In this context, the International Petroleum Industry Environmental Conservation Association (IPIECA) Reports, "Automotive Emission Regulations and their Impact on Refinery Operations", by M. CAMERA and E.H. SPENCER, and "Refineries and Engines as a Single Technical System", by H. Van GULICK, may be of interest.

b) The emission control regulations for motor vehicles, with the relevant measurement methods and test procedures, currently in force in most industrialised countries and certain less developed countries, are based, in the main, on those developed and formulated by :

- UN/ECE Working Party 29 : Regulations No. 15 and No. 24, the first relating to vehicles with spark ignition engines and covering carbon monoxide, hydrocarbon and nitrogen oxide emissions, and the second to vehicles with diesel engines (black smoke). The former is applied by 14 countries and the latter by 9. A third phase in the reduction of emission limits for passenger cars is in preparation, for application from 1 October 1979, calling for the following reductions :

CO : 35 %

HC : 25 %

(of the initial limits laid down by unamended Regulation No. 15)

NO<sub>x</sub> : 15 %

(of the limit specified in the 02 series of amendments).

- The United States Environment Protection Agency (EPA): Federal Standards covering carbon monoxide, hydrocarbon and nitrogen oxide emissions from spark ignition and diesel engines, and black smoke from diesel engines. These are applied in the United States and, with less stringent levels, in Canada. Under certain conditions, the State of California enforces stricter controls than those provided by the Federal Standards. Although maximum emission levels for 1978 vehicles equipped with spark ignition engines were initially set at :



- 0.41 g/mile for HC,
- 3.4 g/mile for CO, and
- 0.4 g/mile for NO<sub>x</sub>

(using the US Federal Urban driving cycle test procedure), they are in fact likely to be kept at the same levels as those applied to 1977 models, namely :

- 1.5 g/mile for HC,
- 15.0 g/mile for CO, and
- 2.0 g/mile for NO<sub>x</sub>.

However, these levels are likely to be changed as a result of amendments being made by Congress to the US air pollution legislation.

- Lastly, the Japanese Environment Agency, which has issued regulations covering carbon monoxide, hydrocarbons and nitrogen oxides, and prescribing a specific test procedure and measurement method. For 1978, the following mean levels are required for Japanese vehicles with spark ignition engines :

- 2.1 g/km for CO
- 0.25 g/km for HC
- 0.25 g/km for NO<sub>x</sub>

as determined by the Japanese "10 modes" test procedure.

For imported cars, the above levels will become compulsory as from 1 April 1981.

- c) Clearly, one of the main problems in comparing requirements as to vehicle exhaust emissions and the results of their enforcement in different countries and areas is that the various measurement methods and test procedures, including driving cycles, are not fully harmonized. Whilst test procedures must take account of local conditions such as driving habits, infrastructure and traffic conditions, Authorities should make every effort to agree, in an acceptable international forum, at least on the equivalence of the methods used for measuring pollutant concentrations. This could be a valuable step and is almost certainly the first condition for further harmonization. Whenever possible, Authorities should aim at progressively eliminating the many dissimilarities in technical legislation applying to motor vehicles for they increase production costs, restrict international trade and occasionally hamper competition. In this connection, Authorities should back the efforts of the UN/ECE WP 29 Group of Experts to widen its membership to countries which have not so far participated in its work and, in liaison with the US Federal Administration, to activate the ad hoc group in charge of harmonizing procedures between Europe and the United States.

### 3.2. Noise Abatement

On this subject, Authorities should bear in mind that, of all the disamenities that are generally the price that has to be paid for technical progress anywhere in the world, noise affects the senses more than any other. It is a direct assault on the human being and thus becomes the most evident and concrete disturbing factor undermining the quality of man's environment. Comprehensive studies on environmental health criteria for noise have been published by WHO and by a number of countries, including the United States. They provide valuable data which policy-makers should take into account when framing noise abatement strategies. Unlike air pollution, the effects of noise are not confined to the dense traffic in urban areas but also arise in the form of peak noise emitted by passing trucks, trains, motor cycles and so on in the depths of the countryside. However, it is mainly in the urban areas of both industrialised and developing countries, where noise causes more and more people varying degrees of discomfort, that the motor vehicle, basically because of the concentration of vehicles in such areas, is one of the dominant sources of noise. Consequently :

- a) Unless other requirements are already in force, Authorities may wish to consider the adoption of UN/ECE Noise Regulation No. 9 for motor vehicles as a minimum requirement. The regulation is already applied in a number of countries, and some governments represented in UN/ECE WP 29 are drawing up more stringent noise controls, consideration being given to the possible application of the following maximum noise levels, based on the ISO R 362 measurement method, as from 1 Oct. 1980 :
- private cars : 80 dBA
  - public transport vehicles < 3.5 T : 81 dBA
  - public transport vehicles > 3.5 T : 82 dBA
  - lorries < 3.5 T : 81 dBA
  - lorries > 3.5 T rated at < 200 HP : 86 dBA
  - lorries > 3.5 T rated at > 200 HP : 88 dBA.

These noise levels may be different if the revised ISO procedure is used (see sub. para (b) below).

Whilst, theoretically speaking, it may be possible to improve upon these levels of noise abatement (e.g. by engine encapsulation), major technical problems first have to be solved, such as cooling, increased weight, lower engine efficiency and higher fuel consumption, all calling for changes in vehicle and engine design, before stricter noise standards can be introduced. Authorities should therefore encourage every step that can be taken to comply, at least, with the above noise levels or their equivalent, and to deal, as a first priority, with the noisier motor vehicles, namely heavy diesel trucks and motor cycles.

- b) While it is generally considered desirable to harmonize noise standards in the same way as air pollution emission control, many difficulties remain in developing common testing procedures and measurement methods. The Environmental Protection Agency (EPA) and some European motor manufacturers associations are presently reviewing various test procedures including those prepared by the EPA and the Committee of the Common Market Constructors (CCMC), and it is not yet clear whether the new measurement procedures which the ISO (International Organisation for Standardisation) has proposed as providing a more accurate reflection of the noise produced by vehicles in normal urban traffic conditions, will be universally acceptable. Here again, Authorities should consult together in UN/ECE WP 29 or, if this is not possible, any other acceptable international body so that ways and means may be considered of developing a common test procedure and measurement method as a basis for the future harmonization of noise standards.
- c) In addition to regulating noise levels in new motor vehicles, it is also necessary to ensure that vehicles will be properly operated and maintained. In this connection, Authorities are strongly urged to consider the introduction of regulations prohibiting any modifications or additions to vehicles whose effect would be to increase sound levels.
- d) Apart from reducing noise at source, it is recognised that the most cost-effective ways of reducing the effects of noise will vary from place to place and call for a combination of different measures. Close co-operation between the various Authorities responsible for environmental conservation, urban planning and transportation will be essential. The measures will include : improvements to road surfaces and the modernisation of infrastructures to give smooth traffic flow, sound insulation in buildings, changes in land-use and in the siting of housing and roads, the use of the right kind of acoustic screen and restrictions on the night time movement of heavy vehicles in certain areas. Authorities are strongly encouraged to bring in additional legislation in these various fields and to issue regulations when called for. All such instruments should be periodically reviewed in the light of new technological developments.

### 3.3. Road Safety

According to WHO sources, about a quarter of a million people are killed and several million people injured every year in road accidents, a considerable proportion being pedestrians. Whilst the economic and social costs of road accidents are comparable in developed and developing countries, the number of traffic accidents and casualties has been appreciably reduced in most industrialised countries over the last few years as the result of technical progress in vehicle design and construction, the introduction of regulations governing vehicle design, periodical inspections and traffic conditions, and

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lastly better roads and driving behaviour. Efforts should continue, especially in the following fields :

- a) Improved vehicle safety standards laying down performance requirements as regards accident prevention and the protection of passengers and pedestrians. In the latter case, performance standards need to be based on better statistical information on the causes of accidents, the way in which injuries and fatalities occur, and ergonomic and biomechanical data, all of which enable the circumstances of accident occurrence to be better identified and vehicle performance better assessed, whilst at the same time providing the basis for the most cost-effective corrective action in liaison with industry.
- b) Regulations on vehicle use including :
  - Compulsory wearing of seat belts with 3-point anchorages, at least in front seats, a measure whose cost-effectiveness and favourable cost-benefit ratio has been amply proved.
  - Special provisions regarding child restraint systems in the light of the experiments conducted in the United States and in certain European countries, now under study by UN/ECE WP 29.
  - Compulsory wearing of efficient crash helmets by all riders of two-wheeled motor vehicles.
  - Speed limits related to road infrastructure, traffic flow and weather conditions.
  - Maximum blood alcohol levels and similar specifications as regards the effect of certain medicines and drugs.
  - Training of professional drivers, taking into account the principles developed by the ILO.
  - Psychological and physiological tests for driving licences applicants.
  - Limits on the number of hours that drivers of commercial vehicles and taxis are allowed to work without a break.
  - Periodical vehicle inspection to check that safety systems are all working satisfactorily (see Section 4.1. below).
  - Improved road conditions, road signs and traffic signals.
- c) Provision by Authorities, with legal force, for the proper education of all road users, including road safety instruction in schools at all levels (see Section 4.2. below).

- d) As appropriate, international harmonization of such measures listed in Section (a) and (b) as individual countries may have taken to improve road safety, priority being given to the following :
- Road accident statistics and their analysis, as a basis for the gradual harmonization of safety performance standards for vehicle design and road infrastructure improvements.
  - Testing of driving licence applicants, the guiding principles for which have already been developed on an international basis by WHO in co-operation with UN/ECE.
  - Limits on the number of hours that bus and truck drivers, at least, are allowed to work without a break, based on ILO 1969 Convention No. 67 on hours of work in transportation and, as appropriate, on the European Agreement on Working Time in Transfrontier Road Transportation (AETP). More information on this subject should be forthcoming from the sixty-fourth International Labour Conference to be held in 1978.
  - Road construction, road signs, traffic signals and traffic management, in the light of the studies and experiments conducted by various countries, UN/ECE Working Party (GE 20) on Road Transport and the OECD Road Research Programme.

#### 3.4. Use of Resources, Energy and Raw Materials

It is worth noting that the United States is so far the only country to have promulgated specific legislation designed to reduce fuel consumption by motor vehicles. The measures give targets to be met by industry as regards the fuel consumption of future models and offer tax incentives, and they are intended not only to promote technologies that improve engine efficiency but also to discourage the manufacture and use of heavier vehicles and to encourage the purchase of lighter ones. Some countries, such as France, the United Kingdom and Sweden are trying to stimulate motorists' interest in fuel economy by making it compulsory to publish fuel consumption figures for motor vehicles at various speeds and over a standard driving cycle. Fuel economy standards should remain a political decision and the responsibility of governments, and the same applies to the share of hydrocarbon fuel allocated to the transportation sector as other non-petroleum sources are developed. As regards the use of resources in general, Authorities should, in the absence of standards, encourage industry to promote vehicle designs that give improved fuel consumption, consistent with other environmental objectives, use lighter and more abundant materials in the place of heavier and scarce ones, and improve recyclability (cf. Section 2 (a) above). Suitable incentives should be offered depending on the cost and availability of these lighter materials.

## 4. VEHICLE MAINTENANCE AND INSPECTION EDUCATION OF ROAD USERS

### 4.1. Vehicle Maintenance and Inspection

Although vehicle manufacturers provide ample literature on vehicle maintenance to users and service garages, faulty or inadequate maintenance is a major cause of road accidents, particularly in the less developed countries where the lack of qualified technicians and inadequate road conditions are a contributory factor. Moreover, good maintenance is essential if vehicle performance is to continue to match the original specifications as regards road safety, air pollution, noise levels, and fuel economy. Although some countries have already introduced regulations requiring vehicles to be inspected at regular intervals in order to check their compliance with safety requirements and, in some cases, pollution control measures, they vary from country to country. Authorities should therefore :

- a) Consider, where not already in force, the introduction of periodical mandatory motor vehicle inspections covering essential aspects of maintenance and condition (e.g. ignition, carburation, braking and lighting systems, and tyres) and to check compliance with regulations on pollution control (emission levels for CO and, as far as possible, for HC and NO<sub>x</sub> in the case of spark ignition engines and for black smoke in the case of diesel vehicles) and noise levels.
- b) Take action in co-operation with industry to ensure that vehicle servicing is adequate and that technical staff are trained so that (a) may be properly implemented.
- c) Attempt, at international level, to harmonize certain minimum vehicle maintenance standards by developing, as appropriate, regionally or internationally acceptable criteria. This could be especially beneficial to the less developed countries where, according to OECD sources, the numbers of motor vehicles in use are expected to triple by the end of the century. In this context, attention is drawn to the general vehicle inspection criteria formulated by the UN/ECE WP 29 Group of Experts on the Construction of Vehicles, the experience acquired by the International Motor Vehicle Inspection Committee (CITA) and the study "Road Accidents as a Cause of Death in Developing Countries" by the Transport and Road Research Laboratory (U.K.), and also to the increasing use of electronic equipment by dealers and garages for testing ignition and carburation systems.

### 4.2. Education of Road Users

Surveys in industrialised countries indicate that drivers themselves are responsible for most road accidents. The point has also been made that the vehicle driver or owner can do much to reduce the environmental impact of his vehicle particularly as far as noise, safety and fuel consumption are

concerned. Lastly there is a need to inculcate into the population as a whole not only good road sense but also an awareness of accident risks and an associated sense of responsibility towards others. In addition to requiring the necessary levels of knowledge, training and skill for the issue of a driving licence, Authorities should :

- a) From time to time mount publicity campaigns encouraging drivers to maintain their vehicles properly, be more alive to the risks of accident and adopt driving styles giving optimum vehicle performance consistent with safety, environmental protection and energy conservation. Drivers should be persuaded to take pride in low fuel consumption rather than high speed.
- b) Ensure that all road users, including cyclists and pedestrians, particularly in developing countries, have the necessary road training and that road safety is adequately taught in school at all levels.
- c) Orient the police towards an educative role in relation to road safety.

## **5. MOTOR VEHICLE MANUFACTURE**

### **5.1. External Environment**

Where the advanced techniques now available for controlling most emissions and effluents from motor manufacturing plants are applied, it is generally recognised that vehicle manufacture is not inherently a highly polluting process. Where there is no adequate legislation covering industrial plants or where it is not enforced, Authorities should introduce the necessary measures and industry should install the necessary equipment for :

- effluent treatment to remove harmful quantities of hydrocarbons, suspended particulate matter, metals, cyanides, acids, alkalis, and soluble oils, using separation, filtration and neutralisation techniques as appropriate and as minimum treatment procedures ;
- adequate dust removal ;
- treatment of odours and removal of harmful quantities of solvents in paint spraying.

Industry should also be encouraged to intensify its efforts to minimize potential environmental problems by appropriate modifications to manufacturing processes and improvements to products.

### **5.2. Working Conditions**

The introduction of mass production techniques, which transformed the motor vehicle from a luxury reserved for the privileged few into a general consumer product, at least in the developed countries, could not have taken

place without a radical change in working conditions. Technical skills and versatile operatives have been replaced by automated machines in order to increase productivity. Manufacturing processes of this kind call for a large and less expert workforce and involve repetitive movement that is a source of monotony and may lead to stress. Many successful work improvement schemes have recently been launched as a countermeasure and the pioneering work done by the motor industry in attempting to improve working conditions and thereby reduce absenteeism, especially in new plants, is recognised. Apart from this, many countries have brought in legislation governing working conditions in plants and workshops. Efforts to improve the working environment should continue with emphasis on the following :

- a) In those countries where adequate legislation does not exist, Authorities are urged to adopt and enforce minimum uniform standards regarding safety, lighting, heat, vibration, noise and ventilation in the working environment, taking due account of the activities of the International Labour Organisation (ILO) which include studies on working conditions and the working environment, and proposed standards.
- b) Experience as regards improving working conditions is not necessarily transferable from country to country or from plant to plant, and industrial management, in co-operation with the bodies concerned, should continue its efforts to improve working conditions, particularly as regards safety, heavy manual labour, noise and health. Specific aims should be to eliminate hazardous substances and exposure to them, to reduce repetitive and boring tasks by innovations in work organisation, to stimulate interest by increasing personal responsibility, to improve human relationships and to restore the dignity of manual labour. A useful reference here is the International Programme for the Improvement of Working Conditions (PIACT) recently launched by ILO.
- c) When transferring motor vehicle manufacturing technology and assembly plants to foreign countries, and especially to developing countries, managements should ensure that the processes and operations involved comply with the industrial legislation in those countries, should it exist, and if it does not, then with the applicable legislation in the country of origin.

## 6. CO-OPERATION AND DISSEMINATION OF INFORMATION

Greater co-operation and wider dissemination of information are essential at a number of levels if there is to be effective action to solve all environmental problems relating to the motor vehicle and to preserve and improve the environment in its broadest sense. There are three main sets of objectives to be aimed at :



- a) Improved knowledge and technologies for reducing the disamenities stemming from the motor vehicle in the most cost-effective way, coupled with the necessary updating of regulations and standards and the introduction of legislation on land-use and integrated transport schemes, particularly in urban areas.
- b) As appropriate, a continuous endeavour to harmonize regulations and standards applying to motor vehicles, priority whenever possible going to measurement methods and test procedures.
- c) A better exchange of information between industrialised and developing countries, so that the latter :
  - are constantly in touch with the situation in industrialised countries as regards the motor vehicle and the environment, and acquainted with the ways and means of improving this situation, including legal measures ;
  - have the necessary information to decide on the measures, and to enact the legislation, that fit their own needs and conditions.

### 6.1. Improving Knowledge and Updating Legislation

This first set of objectives requires improved co-operation between :

- a) Authorities, the international organisations concerned and motor vehicle manufacturers and their associations, with the object of agreeing on a dynamic policy concerning :
  - the motor vehicle as a major social and economic factor ;
  - the motor vehicle and its environmental impact. This would include establishing priorities with regard to the complex problem of desirable versus achievable air pollution and noise control, as well as safety of motor vehicles and road infrastructures, so that technological improvements and innovations keep pace and are consistent with other objectives such as overall fuel economy and vehicle life ;
  - an integrated transportation system in urban areas, including all categories of motor vehicles.
- b) Authorities, motor vehicle manufacturers and their associations, trade unions, the relevant international organisations, universities and specialised laboratories with the object of :
  - adopting adequate health criteria as a basis for legislation on vehicle performance in environmental terms ;
  - promoting, through the exchange of scientific information, both new technologies complying with soundly-based environmental requirements in optimum conditions as regards general cost-effectiveness and improvements in working conditions.

- c) The various responsible authorities and other parties involved, including the general public (by consultation procedures), as regards urban land-use planning schemes and transportation policies designed to improve the urban environment.

## **6.2. Harmonization of National Regulations and Standards**

This second set of objectives has been worked on internationally since 1953 by the UN/ECE WP 29 Group of Experts on the Construction of Vehicles and its various technical Groups of Rapporteurs, made up of representatives of European and other governments including those of Australia, Canada, Japan and the United States, international governmental and non-governmental organisations, and industry. To date, 36 regulations on air pollution, noise and safety in relation to motor vehicles have been drafted and promulgated through a procedure in which information is continuously exchanged and the different national positions reconciled. These regulations are made available to interested Authorities who may adopt them on a voluntary basis or, as in the case of the European Economic Community, enforce them by directives. Nevertheless, as explained in Sections 3.1. and 3.2. above, whilst a complete harmonization of all air pollution and noise standards will be difficult to achieve because of the variety of geographical, meteorological, urban infrastructure and traffic conditions, Authorities and industry are encouraged to increase the extent of their co-operation through UN/ECE WP 29 or other appropriate fora in order to attain the maximum practical degree of harmonization and, as applicable, equivalence in measuring methods and test procedures.

## **6.3. Exchange of Information between Industrialised and Developing Countries**

Apart from existing links between countries through diplomatic channels, various international organisations may play an important role in this essential function :

- a) Through appropriate channels, the OECD could provide interested developing countries with information about the conditions faced by industrialised countries, particularly as regards the interaction - in terms of environmental problems - between land-use, urban planning, transportation and traffic and about ways and means of minimising unfavourable environmental conditions in developing urban areas as illustrated in the transferable situations analysed in its current case study programme.
- b) For those developing countries wishing to set up their own motor industry, the United Nations Industrial Development Organisation (UNIDO) and ILO, together with motor vehicle manufacturers associations in developed countries, may be able - whilst fully respecting the views of the developing

countries concerned - to provide sources of economic and technical information, and data on manufacturing processes, together with guidance on appropriate legal measures for preserving the environment in the neighbourhood of residential plants and for establishing adequate working conditions.

- c) As regards legislation and standards applying to motor vehicles and their use, and to road improvements, UN/ECE WP 29 and GE 20 on Road Transport, and the International Motor Vehicle Inspection Committee (CITA), are in a position to give developing countries full information on environmental protection and safety measures, including minimum vehicle maintenance and inspection, and guidance on the kind of legislation they might find suitable as a means of protecting and improving the environment and road safety in their own specific conditions. To this end, given the flexibility of the UN/ECE WP 29 and GE 20 terms of reference, closer liaison can be established between these Groups and interested developing countries either directly or through periodical meetings.

In the field of international co-operation and the dissemination of information regarding activities on the motor vehicle and environmental protection, UNEP is in a position to perform its own function of co-ordination and information and, whilst not ignoring the problems of developed countries, will give its specific attention to the needs of the developing countries, primarily by providing them with available information on environmental protection and safety measures, and facilitating liaison, as appropriate, with the international organisations concerned.