

TRANSPORT POLICY AND THE ENVIRONMENT IN THE EUROPEAN ECONOMIC COMMUNITY

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El Acta Unica Europea introduce en el tratado de la CEE un nuevo título sobre Medio Ambiente, exigiendo que todas las políticas comunitarias incorporen una dimensión ambiental. Este trabajo muestra que los impactos medio-ambientales del transporte se están tratando de una manera muy dispersa, y en su mayor parte a través de especificaciones estándar para las emisiones contaminantes. El artículo argumenta que mientras esto es adecuado para algunos efectos (ej. polución local del aire) no lo es para todos.

Por otra parte, las tendencias recientes en el sector (ej. «just-in-time logistics») y en la política (ej. desregulación de operaciones) posiblemente contribuyen a agravar el problema. Por tal razón se argumenta que sólo una política que comprensiva y coherentemente internalice los efectos externos y que incluya incrementos en el coste del transporte, podrá adecuadamente hacer frente al problema. Dicha formulación política consistente todavía no existe.

1. Introduction

The concept of a welfare optimum, or Pareto optimum, is one of a situation where no individual can be made better off without at least one other being made worse off. Conventional economic wisdom asserts that this would be achieved if the prices charged for all goods and services were equal to their marginal costs of production. Those conditions are typically associated with atomistic competitive markets. The various ways in which markets depart from those ideal conditions, often referred to as the dimensions of market failure, constitute the case for intervention in the workings of a free market economy.

Within the transport sector many such dimensions of market failure have been identified¹. One of the most important of these is the existence of externalities, the situation in which some of the consequences of an economic transaction accrue to a third party not directly engaged in the transaction. In those circumstances the external consequences will not be taken into account and the price will not represent the marginal cost to society as a whole. The environmental impact of transport is a major source of such distortion.

The environmental effects of transport may be divided into those associated with the original creation of the capital equipment employed, those associated

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¹ Gwilliam, K. M. (1984).

with its use in production, and those associated with its scrapping at the expiry of its life. Whilst there are undoubtedly important environmental issues arising from the selection and recycling of materials for transport equipment we concentrate here exclusively on the operations stage².

The major environmental impacts of transport sector operation which have been of concern may be categorised as follows;

- a) Noxious air pollutants, including sulphur dioxide, oxides of nitrogen, lead, hydrocarbons, carbon monoxide, and particulates.
- b) Global air effects, particularly global warming (mainly carbon dioxide generated) and ozone layer depletion.
- c) Noise.
- d) Other quality of life effects such as visual intrusion, community severance, vibration, etc.

From a transport policy viewpoint these dimensions of impact differ in a number of significant ways.

In *time scale* some are instantaneous (noise), some pervasive but decaying (hydrocarbons), some permanent but constant (visual intrusion), and some cumulative (carbon dioxide). In *location* there is a clear distinction between those that impact where they are generated and those which are transported on a continental or even global scale. Moreover, even for the local pollutants some are predominantly urban, some interurban. In *transport cause* most result from transport vehicle operations, the significance of which varies from mode to mode; some are simply a consequence of infrastructure location of design (visual intrusion, community severance).

For local air pollution road transport appears to be most significant source of carbon monoxide, oxides of nitrogen, and urburnt hydrocarbons, and has in the past been a serious source of lead and sulphur dioxide (See appendix). In respect of global warming about 25 % of the emission of carbon dioxide emissions which are the major long run contributor to global warming come from road transport. However, because of the relatively high warming effect of tropo-spheric emission of oxides of nitrogen³, air transport has been argued already to be contribution about 75 % of the warming effect of the passenger transport sector in EEC within a time horizon of 50 years⁴. In respect to noise, OECD studies in large towns⁵ show that for 50 % of the urban populations transport sources were the most important souce of nuisance. In economic terms Quinet⁶ estimates the cost of traffic noise to vary in the community between 0.02 % in the Netherlands to 1.0 % in Germany, and the costs of air

² For a classification of the environmental impacts of transport and fuller statistics of their impact see M. Linster (1990).

³ Derwent, R. G. (1990).

⁴ ETSU (1991).

⁵ Johnson, S. P. and Gorcelle, G. (1989), p. 224.

⁶ Quinet, E. (1988).

pollutant emission reductions (excluding any greenhouse effect) to be about 0.5 % for EEC as a whole.

The environmental impact varies greatly by mode. For example, of the noise impacts quoted above road traffic was the most important nuisance in 36 % of cases, air traffic in 9 %, and rail traffic in 5 %. For air pollution there are very substantial differences in emissions per tonne-kilometer, with road transport being substantially the worst surface transport polluter. Even such a cursory overview yields the important conclusion that there is not a central environmental problem of transport, but a range of problems of different nature, significance and location, to which the different transport modes contribute in different degrees.

Where transport is judged to be producing a significant environmental detriment attention there are three main *strategies* through which it can be reduced.

- a) Improvement of the individual modes by better system management, better operator performance, better vehicle, fuel, control or infrastructure technology.
- b) Shift to less damaging transport forms (modes or times or locations).
- c) Reduction of the total amount of transportation.

Each of these strategies can be pursued by means of a range of different *instruments* which can be broadly categorised into three types.

- a) Direct regulation of operational decisions.
- b) Investment in technological innovation or in infrastructure.
- c) Internalisation of externalities in pricing systems.

The purpose of this article is to examine the way in which the environmental impacts of transport are being addressed within the policies at the EEC, and particularly to examine the significance of economic instruments.

2. The Single European Act

The Single European Act, 1986 creates the basis for the completion of the internal market within the European Economic Community. The expectation is that this will accelerate economic growth, some aspects of which might accentuate existing conflicts between wealth creation and environmental quality. Article 25 of the Single European Act amends the EEC Treaty by adding to it a new Title on the environment. This new title sets out the framework for the development of a community environmental policy, incorporating the basic principles that preventive action should be taken to protect the environment, that environmental damage should as a priority be rectified at source, and that the polluter should pay. Environmental protection requirements should henceforth be a component of the Community's other policies.

In order to identify where those conflicts might be most pressing the Council of community environment ministers, at their meeting of 1-2 October 1988

called on the Commission to report on the environmental dimension of the single market. A Task Force was consequently set up which reported early in 1990. The report identified transport sector effects as the most important environmental consequences of the single market. It argued «Activity in this sector will be stimulated by supply side effects, including liberalisation of transport services, the projected decline in car prices, and the removal of barriers affecting the road freight industry... The prospective increases in atmospheric emissions would have most serious environmental consequences»⁷.

The addition of the commitment to environmental protection as a treaty objective is thus an important political step⁸. But that does not of itself resolve the crucial questions of priorities between environmental and other objectives, ensure that a set of measures of sufficient internal consistency and strength to achieve the objectives can in fact be implemented, or above all ensure the political acceptability of the practical measures designed to secure the objective.

3. Policy responsibility for air quality

The lead responsibility within the Commission for air quality rests with DGXI. The proposed development of that policy since 1973, has been embodied in a series of 5 year «Action Programmes». The current programme, running from 1987 to 1992, makes numerous references to transport issues, covering pollution related both to vehicles and infrastructure and proposes the development of new low polluting technologies and the maintenance of an inventory of best available low pollution technologies. The statistical basis for policy appraisal is a community information system on the state of the environment (CORINE).

3.1. Emission standards

As far as road transport is concerned, a range of specific regulatory controls have already been implemented. In respect of *vehicle emissions* the Commission made a comprehensive proposal in June 1984 which was not able to command unanimous support in the Council due to disagreement on whether the standards should be framed in such a way as to require a 3-way catalytic converter or not. Eventually, Directive 89/433 set standards for new vehicles of less than 1400 cc engine capacity which incorporate best known practice in respect of emissions of CO, HC, NOX and particulates. These standards are to apply to all models by January 1993. A directive has been proposed to extend that approach to heavy goods vehicles in two steps, the first of which

⁷ EEC (1990).

⁸ For an extensive discussion of the development of environmental policies of the Community see Johnson and Corcelle (1989).

will apply to new vehicles at the beginning of 1993, and a third directive on light goods vehicles is under preparation⁹.

Other possible areas of improvement relate to improvement of the effectiveness of catalysation processes in the warm up stage; in the effectiveness of particulate traps for long distance heavy goods vehicle activities; in vehicle maintenance (where there is a proposal for a harmonised annual inspection of vehicle emission suppression); and in heavy goods vehicle operation (where a directive on the fitting of speed limiters to heavy commercial vehicles is expected in 1991).

In respect of *hydrocarbon fuels* the Council adopted a directive in June 1978 on the maximum authorised lead content in regular or premium petrol as the first stage of a move towards the approximation of national legislation in this area. In 1985 a further directive required member states to ensure the compulsory introduction and distribution of this type of petrol in their territory from 1 October 1989; and a further measure in 1987 enabled Member States to ban the sale of leaded petrol below an octane rating of 85 (regular fuel). Directive 87/219 gave a range of limiting values for sulphur content and a further directive is being prepared to reduce the acceptable sulphur content to a maximum of 0.05 % within four years. The Commission has also given notice of its intention to present a strategy for action against the loss of hydrocarbons into the air through evaporation during 1991.

The question of whether it is possible to set similar standards for diesel fuel content is also under active consideration.

For local pollution the current strategy is thus primarily that of improvement of technology, using the instruments of direct regulation of operations, with emission standards being set at the Community level and enforced by the national governments. The technology does appear to be available to embody very high levels of attenuation. The three way catalysation process can secure reductions of up to 90 % in the rate of emission of CO, NO_x and unburnt hydrocarbons. Both lead and SO₂ emissions can be reduced to very low levels by changes in fuel composition and engine settings. Although there remain some problems about the maintenance of catalysts, their performance in the warm up phase and their application in heavy goods vehicles, there do appear to be possible technological solutions to the problems posed.

The crucial issues here, therefore, are those of ensuring that the technological solutions are applied. Again, however, the use of community wide standards applied through the national licensing systems and enforced through a standardised annual inspection process appears capable of eliminating any incentive to undermine the standard. The fact that the US and Japanese standards are already very advanced in this respect means that there is little resistance from vehicle manufactures and thus it would appear that there is already in place the core of an appropriate and effective policy.

⁹For a fuller discussion of the development of emission standards see Mitchell and Hickman (1990).

4. Policy responsibility for noise

DGIII, Internal Market and Industrial Affairs, is responsible for the formulation of policy on noise pollution from all sources, including transport¹⁰. In transport it has concentrated on the introduction of standards for the level of sound emitted by rail, air and road vehicles.

A first proposed directive for sound emissions in rail transport, submitted in 1983, was resisted by the European railways and was not accepted by the Council. Subsequent work by UIC is to form the basis on which a further proposal is to be constructed, but this action is not yet complete. In this area the Commission appears to be very sensitive to the need to ensure that any new regulations do not inhibit the development of rail transport, which, in general, is felt to be one of the least polluting modes.

For air transport activity has concentrated on determining the dates by which the successively more stringent noise requirements of Chapters 1, 2 and 3 of Annex 16 of the International Convention on Civil Aviation are to be introduced in the Community. Most uncertificated aircraft were prohibited from landing after 1-1-88. In November 1988 the Commission proposed a directive to the effect that after 1 November 1990 newly acquired aircraft should conform to Chapter 3 (the latest) conditions, and in 1990 the Commission submitted a proposal for the progressive prohibition of aircraft already in service failing to conform with Chapter 2 conditions.

For road transport policy has also consisted of the progressive tightening of noise emission standards for vehicles in operation. The standards of 82 dB(A) for cars and 91 dB(A) for heavy goods vehicle introduced in 1970 had already by 1984 been amended to 77 and 81 dB(A) respectively. As a consequence of a report of a working group known as «ERGABRUIT», which reported in June 1988, the Commission was prepared by the end of 1990 to propose further substantial reductions. Similar limitations are imposed on motor cycles.

The efforts of DGIII have thus concentrated, with considerable success, on technical regulation of vehicles. The power of this approach is much more limited. Even if the noise outputs of individual vehicles are effectively controlled the total noise impacts are concentrated at particular times and locations because of the high total traffic volume and it is more difficult to define appropriate standards for acceptable overall noise levels in specific locations. Effective action in these circumstances will then depend on infrastructure design and investment (for example, the building of sound barriers on motorways), and traffic management (for example, to keep traffic out of sensitive residential areas). The subsidiarity principle would seem to dictate that this is an area where the appropriate level of responsibility is local, and that, therefore, a community action is not appropriate.

¹⁰ Stella, F. M. (1990).

5. Policy responsibility for global effects

The heavy dependence of the transport sector on hydrocarbon fuels, and the inevitability of carbon dioxide output in direct proportion to fuel burn, means that policy for reducing the contribution of the transport sector to global warming turns crucially on the success of policies to reduce hydrocarbon fuel consumption in the sector.

The Energy Directorate, DG XVII has therefore put much effort into exploration of the consequences for energy consumption of different political and economic scenarios, including the likely developments in the transport sector. In September 1989 it published its report «Major Themes in Energy», which showed the scale of the task if energy conservation and environmental objectives were to be achieved¹¹. Within the programme SAVE, it has examined legislative and administrative instruments for the achievement of energy conservation, including work on fiscal measures in the transport sector. Within the 4 year programme THERMIE demonstration experiments of new technological possibilities for energy conservation have been identified and supported. Within transport and urban infrastructure three particular areas are identified, namely, urban traffic management; component technology (including some aspects of engine technology); and fuel substitution (including electric vehicles)¹². 27 demonstration projects had been funded in the sector of energy saving in transport by 1989¹³.

For global pollution the prospects of achieving policy objectives primarily through the wider application of currently available technology are not very promising. Because pollution is directly related to fuel consumption the objective of policy has to be to reduce the consumption of hydrocarbon fuels in the transport sector. Whilst *nominal* fuel efficiency has been increased by between 10 and 20 % in the last decade¹⁴ and a further 25 % reduction is considered possible¹⁵, further *real* reductions in fuel consumption per vehicle kilometre of more than about 10 % may be very difficult to achieve. This is because of the effects of deterioration of driving conditions in urban areas, increasing average driving speeds in free flow situations, and adaptive behaviour through which motorists in particular take improvements in fuel efficiency in the form of more powerful or higher performance car ownership rather than in fuel cost reduction. A 10 % saving would in most countries be wiped out by three or four years traffic growth, and indeed would appear to be less than the fuel cost penalty associated with the other emission controls.

A strategy depending on improved vehicle fuel efficiency using standards may thus have limited impact, unless the standards applied were to be sufficiently stringent as to force a substantial reduction in the average size and power of

¹¹ EEC (1990a).

¹² EEC (1990b).

¹³ EEC (1989).

¹⁴ Houston, M. (1986).

¹⁵ U. K. Department of Energy (1989).

vehicles on the roads. Whilst there is some consideration of the possibility of fuel consumption standards it does not appear likely that such a swingeing control would be politically acceptable. That means that effective action in this area must be dependent on entirely new technologies of fuels, or on strategies of modal shift and/or total transport reduction using other instruments. We have argued earlier that current freight transport policies militate in exactly the opposite direction. Even a 10 % shift in demand from private cars to public transport (which would be very difficult to achieve) would only reduce energy consumption by a little over 5 %. This is thus the «achilles heel» of transport policy.

6. Technological development, transport efficiency and the environment

If current technology is not capable of resolving the apparent conflict between the desire to have a free transport market and an acceptable environment the question arises whether there is any possibility that technological development may eliminate the problem. The science and technology directorate, DG XII is currently undertaking a study of the possible contributions of technological development to the amelioration of the environmental effects of transport within its programme SAST. In collaboration with DG VII it is contributing to the international COST 307 action, in which energy saving measures in inter-urban transportation are being studied. It is also currently studying a proposal for a community funded programme of technological research on the development of an environment friendly vehicle presented by the European vehicle manufacturers¹⁶. The proposal covers conventional diesel and gasoline engines, low noise vehicles, electric propulsion, low weight vehicles, vehicle recycling, safe vehicles, alternative fuels and hybrid vehicles. Many of the elements of this proposal cover technological possibilities previously identified in the OECD COMPASS project¹⁷.

6.1. The DRIVE project

The largest current EEC research programme directed towards the transport sector is the DRIVE (Dedicated Road Infrastructure for Vehicle Safety in Europe) programme of DG XIII. The declared objectives of this programme are to improve road safety, maximise road transport efficiency and to contribute to environmental improvements. It envisages the creation of a common European road transport environment (called ERTI) in which drivers are better informed and «intelligent» vehicles communicate and co-operate with the road infrastructure itself. It entails research development and assessment of a range of RTI techniques, the evaluation of strategic choices of candidate systems and a significant amount of standardisation work.

¹⁶ Committee of Common Market Automobile Constructors (1990).

¹⁷ OECD (1986).

In the matter of direct environmental content, there are only two projects which appear to focus primarily on environmental issues. MODEM aims at modelling exhaust and noise emissions and fuel consumption in order to predict environmental changes after the introduction of RTI. PREDICT aims to develop and evaluate schemes for reducing environmental pollution in Central Business Districts through the use of traffic operation and control measures based on RTI technology, and includes and examination of the implications of more stringent emission standards. Both are essentially concerned with urban areas and are primarily directed towards the examination of how better management and operation of traffic can attenuate environmental impacts.

Less directly, environmental concerns may be incorporated through work which will enhance the attractiveness of public transport, or which will facilitate more effective control of traffic volumes.

In the public transport area the programme is fundamentally constrained by its focus on road transport. There are projects on bus real time operational control; on computer aided systems for scheduling information and operation of public transport; and on the development of electronic cards, one application of which might be in public transport pricing. At best, however, these would only have the effect of reducing the increased comparative advantage which private road transport would achieve as a result of success in the programme as a whole.

In the traffic control area there are a number of projects which appear *prima facie* to be aimed at the development of techniques which could be implemented in support of environmentally directed road management strategies. Projects on car-pooling management systems; electronic road vehicle monitoring and pricing; the modelling of parking demand and availability in order to give efficient guidance to drivers; and, more generally, on the identification of the most suitable congestion prevention strategies for particular congestion problems and policy environments might all contribute to environmentally desirable mode shifts. Again, however, the products of at least the last three of these projects might equally well be used primarily to try to squeeze more movement out of a given infrastructure, and, as such, further accentuate the comparative advantage of private road transport. Thus the current efforts in technology development may at best, give some scope for improved environmental outcomes, but by no means ensure them. To do that they must be embedded in a sensible comprehensive policy framework.

7. Towards a comprehensive policy for the urban environment

It is important to put these technological possibilities in the context of a general analysis of the environmental problem in order to identify circumstances in which technological standards may not appear to be enough. The first com-

prehensive policy document of this kind relating in detail to transport policy is the urban «Green Book»¹⁸.

The central concern expressed in the document is that the growth of traffic will outweigh any benefit that would be achieved by the various emission control measures discussed earlier. The imperceptible nature of this growth, with the absence of any discrete «moment of crisis», is seen as blinding society to the emerging problem. Current planning policies - particularly in encouraging strict functional compartmentalisation of cities for environmental reasons - are seen as counterproductive because of the increased transport demands that they generate and the emphasis they inevitably direct towards private transport. Thus the paper argues that, although personal mobility remains the essential requirement of urban life, strict zoning should be avoided, the architectural heritage protected by traffic regulation, and the problem solved within the existing boundaries. The multifunctional city is advocated as that which pollutes least.

The paper concludes with four main recommended lines of action, namely;

1. Encourage city authorities to integrate the development of public transport, land use and road planning by expecting future applications for structural fund assistance to demonstrate that such an analysis has been carried out.
2. Encourage innovative approaches to public transport and the environmental management of urban transport by contributing to the cost of pilot projects.
3. Encourage the Community-wide exchange of information in urban traffic management.
4. Consider the potential use of economic instruments for helping to solve the environmental problems generated by traffic.

The Council has observed favourably on this Green Book, and a series of seminars are being held in each of the member states during the first half of 1991 to discuss how its recommendations may be put into practice. This is a serious problem. For the most part the Green Book proposals involves policies which have already been widely embraced by technicians of urban transport management without being converted into effective action through the relevant national or local political processes. Although the Green Book proposes to support those (desirable) objectives, it offers little or nothing in new leverage to ensure that they are put into practice.

8. The common transport policy and the new directions

Although, as we have seen, a wide range of DG's have responsibilities which impinge on the transport sector, the lead responsibility rests with DGVII. It is in the context of the main thrusts of the community transport policy that the

¹⁸ EEC (1990c).

specific environmental actions so far described must be seen, and to which we now turn.

The Treaty of Rome included a chapter on transport, though Article 84 apparently left it for subsequent determination by the Council of Ministers the extent to which, and procedures by which, provisions should be laid down for sea and air transport. The Treaty provisions aimed at the elimination of conscious national discrimination as an initial step, looked to the progressive approximation of national transport policies as an intermediate requirement, and saw the application to the transport sector of the general rules of the free internal market as the ultimate end. Nowhere was there any explicit recognition of the environmental impact of transport within the Treaty objectives.

Even in respect of the economic objectives it was implicitly accepted that the traditional use of transport sector policies in the member states as an instrument of regional and national economic development policy, and as an instrument in social policy, had produced such complex and diverse sets of internal regulations of the sectors in the member states as to make an immediate introduction of a liberal transport regime untenable¹⁹. The transition from the highly regulated national transport markets to a liberal community transport market was thus seen to require progressive harmonisation of the conditions of operation and constraints in the national transport markets.

The strategy for this transition was embodied in the Schaus Memorandum²⁰ and an ensuing «Action Plan». The first step was to eliminate conscious national discrimination in rates and unnecessary physical and administrative barriers to crossing internal frontiers; the second step would be to secure the integration of international movement within the community through the harmonisation of fiscal, social and technical conditions of operation as the basis for fair and free competition between modes and between countries; and the final step the establishment of a common national transport regulation system within the community through such measures as a common licensing system for entry to the transport markets, mandatory transport price regimes, and common charges systems for infrastructure²¹. The stance adopted by the Commission was widely described as «harmonisation before liberalisation».

Some measures of social, fiscal and technical harmonisation were introduced. But in general the introduction of the necessary legislation to implement that strategy policy was hindered by the unanimity voting requirement in the Council, and even the legislation that was introduced to regulate the operation of the transport industries was often ineffective because of inadequate commitment to enforcement at the national level. Despite the introduction of legislation which formally created the basis for reconciling the maintenance of commonly accepted social objectives the national railway systems in most

¹⁹ Gwilliam, K. M. (1980).

²⁰ EEC (1961).

²¹ Gwilliam, K. M. (1983).

member states remained essentially outside a harmonised competitive framework.

This experience led the Commission to shift emphasis in the late seventies away from harmonisation in the field of operations to harmonisation in the field of infrastructure. In this area some progress was also made. For example, there is a community procedure for consultation between member states on major infrastructure proposals, introduced in the mid sixties, and amended in 1978 to extend its coverage and to ensure that consultation took place at an early enough stage to be effective. Moreover, the Parliament's formal powers over the budget did enable a small community transport infrastructure budget to be allocated. An embryonic European infrastructure plan has already been proposed by the Commission complemented by an action programme (see COM(88)340 and COM(89)238).

On common infrastructure charging regimes there was much study and some preparatory regulation (such as the enforcement of a common basis of assessment for road vehicle taxation). But here also some crucial elements of a common policy based on harmonisation remained elusive. The infrastructure investment consultation procedure was weak, the community infrastructure budget too small to be effective and lacking any objective allocation criteria. Above all, fiscal powers remained with the member states.

8.1. The policy acceleration

During the eighties the pace of development of the common transport policy began to accelerate partly as a consequence of judgements in the Court of Justice in 1974 and 1978 that the common transport policy should not be confined to land transport but should also cover sea and air transport, and the action taken before the Court against the Council for its non-performance of its duties under the Treaty in respect of transport. It is the nature of these recent developments, and their consistency with the new environmental requirements that is of particular concern here²².

a) SEE TRANSPORT

In sea transport the existence of liner conferences in general cargo shipping, agreeing schedules of service, tariffs, and forms of traffic protection, appeared to be contrary to the general competition rules of the Community. However, the size of the EEC flagged fleet and its share of trade fell by about a quarter in the first half of the decade of the eighties. This loss of share was associated with the expansion of national intervention in other countries both in the form of direct subsidy and cargo reservation, particularly by the state trading countries, and with the increasing practice of shipping being operated under «flags of convenience» to secure lower labour costs, less strict operating condi-

²² For further commentary on changes in the late eighties see Gwilliam, K. M. (1990).

tions and more favourable tax treatment. The developing countries were also claiming the right of cargo reservation under what was known as the UN Liner Code and the state trading countries effectively claiming it through their trading terms. The essential problem facing the community was therefore that of reconciling the wish to secure a free competitive market in shipping with the danger that this would destroy its shipping capacity and reduce standards of safety as well as those of environmental quality.

Several steps were taken to confront these problems. Liner conferences and loyalty agreements were exempted from the conditions of Article 85 of the Treaty conditional on the good conduct of parties, with the Commission, and ultimately the Court of Justice, monitoring and enforcing reasonable behaviour. In the «Brussels Package» of shipping policy measures, agreed in 1983, the Community accepted the «40:40:20 rule» for traffic reservation in liner trade with the third world, but refused its application either in other trades or trade relations. Regulation 4057/86 gave powers to the Council to take retaliatory action against unfair pricing practices in shipping, which were used for the first time in 1989 by the introduction of a redressive duty on cargo carried on the liner service of Hyundai Merchant Marine Company of Korea. «Flagging out» is being addressed by the creation of a Community register to be called «Euros» which will enable shipping to fly the Community flag and qualify for certain specific cost reducing advantages.

Internally, structural overcapacity in the inland waterway sector was addressed by a proposal for a two part system involving measures to harmonize national capacity scrapping schemes along with arrangements to avoid the impact of this being cancelled out by new vessels being brought into service.

Safety and environmental protection has been a burning issue in the development of these shipping policies. The Commission makes substantial contributions to IMO actions on environmental pollution and liability. Internally, within the Community, following the Amoco Cadiz disaster in 1978, a series of recommendations and directives were adopted to improve safety at sea for Community vessels. In an attempt to enforce international standards of safety and pollution prevention the present policy thrust is to the enforcement on all ships entering EEC ports. What happens outside the ports, of course, is not easily controlled by the Community institutions.

In shipping policy, therefore, there seems to be a common interest in measures which will allow environmental and safety controls to be maintained for community shipping, and ships entering ports within the community, without the danger that such a policy will simply drive trade increasingly into fleets maintaining lower standards. The adverse effects of competition on environmental quality are, as far as possible, being constrained.

b) AIR TRANSPORT

In air transport the situation is rather different. European governments have traditionally pursued very restrictive, anti-competitive policies. But the dere-

gulatory zeal of the United States and the development of charter and inclusive tour operations in Europe, sanctioned bilaterally by mutually benefitted governments, has eroded the traditional IATA tight control and has encouraged scheduled airlines to protect themselves by increasingly complex promotional and discriminatory pricing arrangements. Against this background it is the Commission which in Europe is making the pace towards liberalisation.

The first major step came in 1983 when the directive on inter-regional air services provided for a greater freedom of fare setting on services using small aircraft between non-major airports, which was subsequently modified to allow its applications to flights from regional airports into major airports. The most striking stimulus to action was the 1986 judgement of the Court of Justice in the *Nouvelles Frontieres* case that community competition rules did apply to air transport, and that it was thus illegal for governments to control fares.

Although a package of measures introduced in December 1987 provided block exemptions from the application of competition rules such exemptions would be henceforth subject to strict control. More significantly, as part of the same package, a directive on fares and a decision of the sharing of capacity substantially reduced the scope for the exercise of national sovereignty by setting objective criteria for the range within which fares and the protection of the national share of markets could be limited. Multiple designation was provided for on some of the major intra EEC routes, while the creation of new traffic rights between regional and major airports opened the way for more extensive competition between the major hubs. A further package of proposals was presented to the Council in December 1989, to further improve market access by phased relaxation of general traffic sharing rules and restrictions on traffic rights, and by increased freedom of establishment and entry for new carriers. Fares freedom would only be subject to control where both affected countries disapprove, whilst predatory practice would be protected against by an appeals procedure against excessively low or high fares.

The potential environmental consequences of these trends are serious. Whilst the evidence seems to suggest that air transport contributes relatively little to local air pollution in the vicinity of airports, and noise effects are being addressed through controls on aircraft, its contribution to global warming is already great. Although the European air system is already largely a hub and spoke type of network, and therefore is unlikely to change as radically as did the domestic network in the U. S. after airline deregulation, the expected reduction in fares, and the greater freedom of entry to the market, might well be expected to generate new traffic and, possibly increase the air share of the existing market. Capacity shortages at some major airports might be overcome by greater use of regional airports which might incidentally reduce average aircraft size (or at least attenuate the pressures to increased aircraft size that airport congestion would cause). Capacity shortage in air traffic control systems appears to be widely regarded as a bottleneck that can be overcome by investment in new technology and institutional co-ordination. Liberalisation is thus likely to result an increased market for this relatively

damaging mode. The air transport policy appears to be lacking any clearly stated environmental objective or the appropriate analysis to inform an environmentally sensitive policy.

c) LAND TRANSPORT

In land transport the wide ranging acts of liberalisation largely associated with, or stimulated by, the Single European Act, are likely to have the most radical consequences. The attention of the Commission has returned to the field of transport operations, but in the quite different spirit of a principled commitment to liberalisation unless there was a very strong basis to act otherwise. Despite the absence of a common tax structure, and the continuation of differences in labour costs which might be expected to militate against the competitive power of some of the North-western countries, the attitude which now appears to prevail is that any distortions which this might create are insignificant in comparison with the benefits of a more liberal transport sector.

For international road haulage a quota of Community licences was first introduced in 1969 and has been increased slowly since. For the years 1988 and 1989 the Community quota was increased by 40 % per year and in June 1988 the Council gave an unconditional legal commitment that from 1st January 1993 access would be based on qualitative considerations only, and would not be subject to quota. Moreover, in December 1989 the Council adopted a regulation providing for a quote of 15,000 cabotage licences to be issued, this quota to increase by 10 % each year, with a final arrangement of cabotage to be introduced in January, 1993. Given that rate fixing by free agreement became the formal, as well as the de facto, basis for pricing at the beginning of 1990 there now exists the basis for a substantial expansion of the scope of the international road freight sector.

A similar liberalisation is under way in international long distance coaching as in a proposal presented to the Council in December 1988 the Commission urged the Council to liberate and to simplify administration in this area.

Rail transport has been provided in all member states by a statutory, nationally owned undertaking, either directly or indirectly subsidised, and has been used in most as an instrument in the implementation of policies for regional development and income distribution. This conflicts in principle with community policies on fair competition between modes of transport and between locations.

Initial attempts to provided for fair competition between modes led in the late sixties to regulations requiring that railway undertakings should be treated as financially autonomous, and that any special obligations imposed on them should be the subject of specific subsidy. Regulations legitimised direct compensation for public service obligations, from any special employment and pension obligations arising from the nationalised character of the rail companies, and to countervail undercharging for infrastructure by other modes. In

the late seventies further regulations specified common rail accounting systems and uniform principles for the costing of international rail traffic.

In practice these regulations had little effect because of the absence of any mechanism to ensure that only «acceptable» subsidies were being granted and the general unwillingness of governments to forego their traditional control over rail policies. In memoranda on rail policy in 1980 and 1984 the Commission argued that railway managements had been unable to adapt to new needs because of the rigidity of both their structures and their technology, resulting from excessive and ill directed government intervention, inadequate investment funding, and low operational efficiency.

In December 1986 the Council of Ministers reached agreement on the principles to be adopted for the future financing of the railways. Current charges representing the servicing of past debts were to be reduced and differences between the systems of payment for infrastructure by rail and other modes were to be eliminated by the separation of responsibility for rail infrastructure, which would rest with government, from that of operating services, which would be the responsibility of rail management. Compensation for public service obligations was to be in the form of contract payments; and a suitable discipline should be imposed on deficits outside these arrangements. As a further step to stimulate the railways the Council called on the Commission in December 1989 to set up a working group on the development of a European high speed rail network which might receive some funding, as a major user of steel from the ECSC.

The net environmental impact of these land transport policies is almost certainly substantially adverse. Within the transport policy itself there is no direct concern with environment. There is already an underlying trend in logistic systems towards «just in time» organisation, which favours road transport at the expense of other modes. The rate of growth of freight movement which has over the last decade between twice that of national incomes, will continue to be high. There is also a continued shift in the composition of goods moved away from the bulks which are more efficiently rail or waterway borne towards semi manufactures for which road transport is more attractive. Liberalisation will have immediate and substantial impact in the road transport sector. The proposed developments in the rail sector seem likely to be weaker in effect and longer in gestation²³. The road transport share of the freight market is thus likely to be further increased.

9. Designing an effective community policy package - Group Transport 2000 Plus

No explicit policy has yet been adopted specifically for transport and the environment. In December, 1989 Commissioner van Miert established a small

²³ For discussion of the structural changes considered necessary to facilitate significant improvement in the competitive position of rail transport see Cerwenka, P. (1990).

group of experts called Group Transport 2000 Plus with the task of compiling medium and long term definitions of the European Community's internal and external transport problems. The consulted very widely and reported in January, 1991²⁴.

The group argues that the role of the EC in transport follows from two considerations. Firstly, the Treaty of Rome requirement for fair and effective competition is taken to be inconsistent with any traffic congestion serious enough to hinder trade. Secondly, the new environmental objectives are interpreted to require a plan of action including definite measures for the short and long term. The task of policy formation is seen as that of securing an appropriate balance between these objectives. Significantly it is argued that transport should not be used as the sole or even the chief instrument of regional development.

Institutionally, the subsidiarity principle is interpreted in the positive sense that the Community should grasp those challenges which can only be confronted at the Community level. In particular it is argued that the Community should set standards in areas including environment, give incentives for their achievement, and impose sanctions to support their maintenance.

Much of the proposed Community action which follows from this is already familiar. An essentially commercial market oriented transport strategy is proposed. Liberalisation and harmonisation of transport markets are seen as simultaneous objectives. It is explicitly observed that transport is currently supplied too cheaply and that prices should be related to real costs. Unfair price discrimination should be prevented, though economically desirable forms of co-operation such as marine consortia, airline mergers or cross border railways agreements should not be hindered by unduly simplistic application in the transport sector of the general rules on competition.

The group argues that a clear policy on transport and environmental issues is required, integrating high technological standards with measures to influence mobility and mode choice. Despite the earlier arguments for the internalisation of external costs in prices, the environmental arguments are seen to justify subsidy of urban public transport and of intermodal transport infrastructure. That apparent logical inconsistency might possibly be explained as an interim necessity occasioned by the impossibility of getting prices right quickly enough. It does appear, however, to be symptomatic of a more fundamental tension in the report between the logical consequences of an underlying free market philosophy and the more conventional predisposition to keep money prices down and to secure social objectives by physical regulation and subsidy. Other examples of the more conventional position are the suggestion that any increase in the variable tax costs should be compensated by a reduction of the fixed costs to leave the overall fiscal burden unchanged; and the recommendation that all monies collected from the transport sector should

²⁴ TRRL (1980).

be spent in that sector, specifically to give users a major improvement in the price/quality ratio.

If, as the report implies, there are environmental costs of transport for which the sufferers are not directly compensated then hypothecation of tax revenues to transport expenditures, even if transfer between modes is possible, will be giving the wrong signals about the optimal total amount of transport. The theoretical basis for the establishment of a balance between the economic benefits of transport and its environmental costs offered by the Group Transport 2000 Plus is thus not correct. If economic instruments are to be used as the means of reconciling the efficiency and environmental quality objectives of the community they must be comprehensive and coherently designed. We therefore turn finally to present our own synoptic view of policy for transport and the environment.

10. An economic policy for transport and the environment

We have argued that the community transport policy emphasis on liberalisation of the air transport sector and road transport markets is likely to generate total traffic and modal shift effects which, in respect of the global air pollution, and to a lesser extent noise, impacts, will dominate and vitiate any good which can be done by the use of direct regulation of emissions at source. Moreover, the present policy instruments which are designed to benefit the more environmentally acceptable modes largely involve investment (the European high speed rail network and combined transport facilities) which are slow acting, whilst those impacting in favour of road transport (liberalisation) will have immediate effect. Once activity locations and industrial structures have adapted to the more immediate stimuli they will ipso facto be less sensitive to the delayed impacts of the other measures.

Most member states have paid lip service to the proposition that transport imposes high environmental costs. But they have mostly shown great unwillingness to reflect high real costs of transport in high taxation, particularly in the freight sector. Instead they have tried to avoid the issue by a combination of environmental standards on individual modes and mild inducements to traffic restraint and environmentally friendly mode choice. At the moment economic instruments, mainly charges, are used within the community predominantly as an adjunct to direct regulation. Tax differentiation has already been successful in several member states in securing rapid conversion to unleaded petrol and to cleaner cars.

That limited use of economic instruments is sometimes justified on the grounds that modal cross elasticities of demand in the passenger market²⁵ and the freight market²⁶ are very low. Hence attempts to secure traffic reduction or modal shift by pricing means have little effect, merely instigating adaptive res-

²⁵ TRRL (1980).

²⁶ Netherlands Ministry of Transport and Public Works (1990).

ponses to maintain the dependence on private road transport. In the passenger market reorganisation of trip distribution timing, routing, may be resorted to in order to retain the perceived advantages of the road mode.

The fact that demand is relatively insensitive to price at current price levels does not mean that it will be so at all price levels. Low current price or cross price elasticity of demand is thus not a conclusive argument against the use of economic instruments. Only if there were no adjustment in transport activity patterns at price levels which fully internalised the total economic and environmental costs of transport would there be a case for saying that no further action should be taken to discourage the total level of traffic. The particular danger in relying on environmental standards is that they tend to be set at a level which embodies best current practice technology at reasonable cost. As such the impact on the price of transport may be much less than that which would be implied by the full internalisation of all external costs.

The move towards greater reliance on internalisation measures is not without difficulties. Only charges of an appropriate magnitude can be expected to be effective. Particularly in the context of the approach to global warming this is seen to require a substantial but phased increase of energy prices over time²⁷. That will inevitably create a vested opposition amongst those for whom fuel costs represent a relatively large proportion of total costs. An uneven application of those charges will cause trade distortions and may, through a kind of free rider mechanism, lead to an international competition in undercharging.

There are other pressures militating in that direction. Vehicle manufacturers prefer the imposition of high environmental standards, which increase the costs of the product that they sell and hence their turnover, to fiscal measures which syphon off part of the perceived expenditures on motoring into the public purse. Road transport operators will have a similar preference for measures which attenuate environmental effect without reducing their outputs.

Overcoming that vested resistance to radical policy change requires action over a wide range of institutional levels and forms. For instance the Urban Green Book recommendations for the transport sector mostly take the form that the Community should encourage municipal authorities to pursue certain types of policy. Unfortunately, not all have the same level of understanding of the environmental issues involved, or indeed the same interests in them. The more indirect the channel of implementation of policy the less effective it is likely to be. This immediately brings into question the principle of subsidiarity. Article 130 R (5) of the revised Treaty embodies the «subsidiarity principle» by stating that «the Community shall take action relating to the environment to the extent to which the objectives... can be attained better at the Community level than at the level of the individual states». Given that atmospheric warming, is a global long term effect, and that no immediate benefits accrue to responsible actors, the free rider syndrome will almost inevitably result in an excessive level of CO₂ emissions. It is therefore arguable

²⁷ EEC (1990d).

(as indeed DGXI suggests in its Urban Green Book) that environmental policy should be considered as appropriate for the community level.

Perhaps the most important immediate step that the Community could take would be to obtain agreement that this issue should be treated at the community and not at any subsidiary level.

Thereafter, the essential elements of a Community policy for transport and the environment thus seem to be as follows.

1. There should be a comprehensive policy statement specifically confronting the environmental as well as the economic aspects and outputs of the policy.
2. The appropriate levels for action should be explicitly confronted, with particular emphasis given to areas where only community level action is deemed appropriate.
3. Total cost statements —including environmental costs— should be prepared for all transport modes.
4. Fiscal structures relating to transport should be determined at the community level with tax harmonisation in the upward direction so that all modes pay fully for the use of infrastructure and for the environmental costs that they impose.
5. Territoriality should replace nationality as the basis of taxation at least for freight transport.
6. Local discretion should then be left to member states in local transport planning.

There are already some favourable signs of progress in this direction.

External pressures (such as the Swiss and Austrian policies to discourage heavy roads goods transport) are forcing some consignors into non-road modes or into combined transport. In tandem with the work on urban policy DGXI has been preparing a communication on the use of economic and fiscal instruments, reviewing a range of economic instruments including environmental charges and taxes, tradeable emission permits, deposit-refund systems, enforcement incentives, financial aid, industry agreements and environmental liability.

In the context of this kind of consistent attempt to internalise externalities there need be no conflict between the current emphasis on liberalisation of operations and elimination market distortions and environmental objectives. Market freedom, technological development, environmental standards and fiscal measures would become complementary elements in a comprehensive policy.

Appendix 1. The Environmental Impact of Transport in the EEC

(This is an extract from the interim report of the SAST-3 project on technological policy towards the environmental impacts of transport. I am grateful to the SAST Directorate for permission to use this background material).

A1.1. The growth of transport outputs

The transport sector plays an important role in the economic life of industrialised countries. Estimations made by the OECD indicates that the production and maintenance of mobile equipment and transport infrastructures represents 4 to 8 per cent of the GDP and 2 to 4 per cent of jobs.

The transport sector is characterized in the last two decades by a strong expansion. In the period 1970-1990 passenger kilometres travelled increased in Europe by 75 % (2,7 % per year), while freight ton kilometres grew by 50 % (2,1 % per year) in the same period. In 1987, in the EEC, the transport sector consumed 28 % of the energy balance of the Community (20 % in 1973). Road transport accounted for 84 % of the total energy consumed by the sector. This share has remained almost unchanged since 1973. In the last two decades the average fuel efficiency of new cars in the EEC decreases from 10 litres/100 km to 8.2 litres/100 km, though this effect was more than counterbalanced by the growth of car ownership per 1000 inhabitants from 192 to 381 in the same period.

The composition of this traffic has altered considerably over the last two decades. Between 1970 and 1990, the relative importance of passenger transport by rail has declined to not more than 7.5 % in 1990 whilst in the same period road transport has doubled. Within the twelve member states of the European Community almost 70 % of the freight transport take place by road transport. 90 % of this freight transport by road is taking place over no more than 150 kilometers.

TABLE A1
Eur. 12 Passengers mobility 1970-1990
(in milliard trav. km)

	1970	1990
Rail	182,4	229,7
Road (private cars, autobusses)	1.590,6	2.826,3
TOTAL	1.772,9	3.055,9

Source: E. Jacobs (1990).

TABLE A2
Eur. 12 Freight transport in milliard ton km

	1970	1990
Rail	207,4	176,6
Road	389,1	772,6
Inland waterways	103	103,2
Pipelines	60,5	67,4
Air	—	—
TOTAL	760	1.119,8

Source: E. Jacobs (1990).

41.2. *The environmental effects of transport*

There are also substantial negative effects of transport, such as air pollution, noise, congestion, accidents, etc. It is estimated that the public expenditures related to the transport sector, the non internalised cost social costs of road transport, amount to about 5 per cent of GDP for OECD countries. The external socio-economic cost of transport could well represent above 200 billion ECU (5 % of EEC's GDP in 1989).

TABLE A3
The environmental costs of road transport (as % of GDP)

	OECD	Community of European Railways
Pollution (a)	—	0.7 - 1.5
Congestion (b)	—	2.6 - 3.1
Accidente (c)	—	2.5
Total (d)	5	5.8 - 7.1
Environmental costs in 1989 be ECU (e)	220	265 - 312

Source: OECD (1988).

Transport activity has a large impact on the environment and a direct impact on the life of the citizens. Most attention in this respect is given to the operation of transport equipment. But there are also less direct (sometimes invisible) influences of the transport activities, including those of energy consumption, land consumption (transport infrastructure), natural resources for the production of vehicles and the construction of the infrastructure and the solid waste.

A methodological approach to study the total impact of a transport vehicle or infrastructure, is to identify the stages of the life cycle of the asset as follows.

- stage 1: materials input, acquisition,
- stage 2: production of vehicle and infrastructure,
- stage 3: operation,
- stage 4: decommissioning,
- stage 5: disposal or recycling.

From the environmental point of view each stage has its specific impact on the environment. In practice most research is taking place in the operation stage. Apart from the impacts of noise, accidents and traffic congestion there are also major impacts on air, soil and water quality at different levels (local, regional, continental and global).

The dimensions of impact differs in significant ways. In time scale some are instantaneous (noise), some pervasive but decaying (hydrocarbons), some permanent but constant (visual intrusion), and some cumulative (carbon dioxin). In location there is a clear distinction between those that have a impact where they are generated and those which are transported on a continental or even

TABLE A4
Selected environmental effects of principal transport modes

Principal transport modes	Air	Water Resources	Land Resources	Solid Waste	Noise	Risks of accidents	Other impacts
Marine and inland water transport		Modification of water systems during port construction and canal cutting and dredging	Land taken for infra-structures; dereliction of obsolete port facilities and canals	Vessels and craft withdrawn from service		Bulk transport of fuels and hazardous substances	
Rail transport			Land taken for rights of way and terminals; dereliction of obsolete facilities	Abandoned lines, equipment and rolling stock	Noise and vibration around terminals and along railway lines	Derailment or collision of freight carrying hazardous substances	Partition or destruction of neighbourhoods, farmland and wild life habitats

TABLE A4 (Continuación)
Selected environmental effects of principal transport modes

Principal transport modes	Air	Water Resources	Land Resources	Solid Waste	Noise	Risks of accidents	Other impacts
Road transport	Air pollution (CO, HC, NOx, particulates and fuel additives such as lead) Global Pollution (CO ₂ , CFC)	Pollution of surface water and groundwater by surface run-off; modification of water systems by road building	Land taken for infrastructure; extraction of road building materials	Abandoned spoil tips and rubble from road works; road vehicles withdrawn from service; waste oil	Noise and vibration from cars, motorcycles and lorries in cities, and along main roads	Deaths, injuries and property damaged from road accidents; risk of transport of hazardous substances; risks of structural failure in old or worn road facilities	Partition or destruction of neighbourhoods, farmland and wild life habitats; congestion
Air transport	Air pollution	Modification of water tables, river courses and field drainage in airport construction	Land taken for infrastructure; dereliction of obsolete facilities	Aircraft with-drawn from service	Noise around airports		

global scale. Moreover, even for the local pollutants some are predominantly urban, some interurban. In transport cause most result from transport vehicle operation, some are simply a consequence of infrastructure location or design (visual intrusion).

TABLE A5
Hierarchy of the impact on the environment by modes of transport

	Air pollution	Water pollution	Soil pollution	Health and safety
Route	***	*	***	***
Rail	*		**	*
Inland waterways		**	*	
Ses	*	**	*	
Air	*		*	*

* Small impact. ** Significant impact. *** Grest impact.
Source: OECD, op. cit.

For the various forms of air pollution the available evidence, shown in table A6, shows transport to be a significant source of some pollutant.

TABLE A6
Air emissione (%) - 1987 - EEC

Sector	CO2	SO2	NOX
Energy	37.5	71.3	28.1
(Elect. centr.)	(29.3)	(61.5)	(24.6)
Industry	18.6	15.4	7.9
Transport	22.9	4.0	57.7
Others	21.9	9.3	6.3
TOTAL	100.0	100.0	100.0
	(2.7 mrd t.)	(14 mio t.)	(9.8 mio t.)

Source: Energy 2000.

The environmental impact varies greatly by mode. For air pollution there are very substantial differences in emission per tonne kilometre, shown in table.

TABLE A7
Emission factors by mode for freight transport

	Emissions (gr./t. km.)				Energy consumption
	CO	HC	NOx	SO2	(MJ/tkm)
Road	0.35	0.27	0.94	0.06	1.4 - 4.1
Rail	0.00	0.00	0.07	0.06	0.74
Inland waterway .	0.11	0.04	0.24	0.03	0.46

Source: Strategic Plan for Rail Freight. Study commissioned by the Dutch Ministry of Transport and Public Works, Rotterdam, July, 1989.

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Abstract

The Single European Act introduces a new environmental title into the Community Treaty, requiring all community policies to have an environmental dimension. The paper shows that the environmental impacts of transport are currently addressed in a very dispersed way, and mostly through the specification of emission standards. It is argued that while this may be adequate for some effects (e. g. local air pollution), it is not appropriate to all. Moreover, recent trends in the sector (e. g. just-in-time logistics) and in policy (e. g. deregulation of operations) are likely to make the problem worse. It is therefore argued that only a policy which comprehensively and coherently internalises the external effects, and which involves increasing the money cost of transport, will adequately address the problem. Such a consistent policy formulation does not yet exist.

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