

# Integration of Road Transport Safety and Environment Policies

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## Background

The Organisation for Economic Co-operation and Development (OECD) is an international organization that represents the 29 most highly developed nations in the world. In 1968, a Programme in Road Transport Research was created to provide for regular interaction and exchange between national road researchers from OECD Member countries. For the past 30 years, the Programme has operated on 3-year cycles, having been renewed 10 consecutive times by the OECD Council. The most recent renewal occurred in December 1997. At that time, the title was changed to the Programme of Research in Road Transport and Intermodal Linkages (RTR) to better reflect a strategic framework in which roads are viewed as an integral part of the entire transport system to assure integrated seamless transport. The Programme is part of the Transport Division in the OECD Directorate of Science, Technology and Industry. Every 3-year programme of work includes activity centres that help to focus the RTR research efforts. The activity centres have

changed gradually over time and reflect priority areas for the Member countries. For example, the 1998–2000 programme of work includes the following three activity centres:

- Sustainable Multimodal Transport Strategies
- Economic Performance, Transport Infrastructure and Management
- Transport Safety and Environment

In this case, Sustainable Multimodal Transport Strategies is an entirely new area for the RTR as it was not an activity centre prior to 1998. The addition of this subject field to the programme is a reflection of the heightened importance countries are placing on intermodal transport and the value they see in international research in support of its development. Detailed descriptions of the current and past RTR programme can be found on the OECD Homepage at <http://www.oecd.org>.

### A new concept: integration of environmental and safety policies

Both road safety and environment have been long-standing features in the RTR and they remain central to the research programme because of the tremendous

impacts they have in the world. For instance, there are annually over 500,000 road traffic deaths and 15 million injuries worldwide. This represents 1400 fatalities and 41,000 injuries per day, of which more than one quarter are in OECD countries. Economic losses amount to anywhere between 1% and 4% of GDP in OECD countries depending on the method used. These numbers indicate that traffic safety remains an important public and social priority issue as well as an economic challenge.

Like safety, the environmental impacts of transport infrastructure, traffic demand and mobility requirements are increasingly challenging OECD Member countries. One impact of the growing demand for travel and mobility is increasing traffic and congestion which results in air quality and roadside noise impacts that generate health, economic and social concerns in many OECD countries. In most OECD countries, the largest share of transport activity is by road. It is not a surprise then that road transport is responsible for over 80% of final energy consumption for transport. In the coming decades it is expected that both the number of vehicles and the amount of road travel will grow substantially. For example, passenger car kilometres in the European Community and Japan more than doubled between 1970 and 1990 and freight transport tonne-kilometres saw annual increases on the order of 10 per cent in the same period (OECD 1994a). Further, it was estimated (OECD, 1994b) that between 1995 and 2005 urban motorway travel would increase by about 50% and could lead to delay increases on the order of 400%. Overall activity involving heavy vehicles will increase even more. The environmental impacts of this activity are clear. For instance, it has clearly been shown (OECD, 1997b) (i) that road transport is currently the overall single largest contributor to total air pollution—51% of NO<sub>x</sub>, 22% of CO<sub>2</sub> and



The Prius hybrid car uses both a conventional gasoline engine and a battery-driven electric motor. (Toyota Motor Corp.)

75% of CO<sub>2</sub>; and (ii) that as a share of total air pollution, the contribution by road transport is generally increasing while the shares of all other sectors are decreasing. Roadside noise has also been shown to be a significant environmental factor both by an increasing percentage of the population subjected to road noise at all levels and in terms of complaints received by road authorities in the OECD countries (OECD, 1995). In most OECD countries, the cost of congestion amounts to about 2% of GDP, with noise and local air pollution costing a further 0.5% to 1% of GDP. Estimates of the long-term cost of CO<sub>2</sub> emissions that contribute to global warming vary between 1% and 10% of GDP. As a major contributor in all of these areas, road transport deserves special attention.

Until now, little consideration has been given to the integration of safety and environmental concerns, yet the environmental and traffic safety aspects of the transport system are closely related, especially from the perspective of human health and well-being. For instance, urban and road transport planning usually take account of both traffic safety and environmental concerns, but each factor is often dealt with separately. As a result, there are only a few examples of strategies that strive to take account of both concerns in a simultaneous and integrated manner. This fragmented approach can be explained by:

- A different focus for safety versus environmental objectives
  - The involvement of different actors in each of the fields
  - An imbalance of knowledge between the two fields—i.e. safety experts know little about environment and vice versa
- This is of concern to transport professionals because separate strategies may result in conflicting measures and administrative competition. Even if they are acting with parallel aims, separate and uncoordinated strategies may achieve overall improve-

ments, but they may also have unfortunate results. The integration of both aspects at an early planning stage will clearly have positive impacts both for social well-being and for the economy as a whole.

It was this understanding that led the RTR to initiate a research project in 1995 that was designed to stimulate a new way of thinking in relation to the integration of safety and environment. An Expert Group was formed and charged with studying how evaluation methods and planning tools could be designed and implemented to give equal and co-ordinated consideration to the safety and environmental effects of road transport. Due to the complex nature of the research, the Group considered policy-setting within the road administrations only and excluded other sectors—i.e. health, police and other administrations—that have a stake in road safety and environment. Fifteen OECD countries participated in this activity along with the RTR and the OECD Environment Directorate. The study lasted 18 months and the final report (OECD, 1997a) was published in October 1997 and followed by an international seminar on the same subject (OECD/FinnRA, 1998). The Group undertook an extraordinary effort that challenged the traditional way of thinking about transport policy-making.

### **Possible Conflicts of Safety and Environmental Policies**

Traffic accidents and pollution are both closely linked to common factors such as: traffic flow, speed and the composition of traffic. The strategies, which aim to prevent accidents and pollution, are based on the same principles of action: travel demand management, improving the safety and environmental performance of vehicles, promoting the use of modes that perform better with respect to safety and environmental protection and encouraging appropriate user behaviour.

But this does not mean that a measure taken to improve traffic safety will automatically have a positive impact on the environment. Measures to improve the situation in terms of safety can have negative effects on the environmental side and vice versa. Some examples of these conflicts are:

- The construction of a noise barrier will reduce the noise level of the surrounding area, but can have negative consequences from a safety point of view if the visibility of the driver is affected.
- The use of de-icing salt to improve the safety of winter driving may be harmful to the environment.
- The widespread use of electric vehicles will prove extremely beneficial in terms of reducing air and noise pollution as well as significantly cutting fuel consumption. However, the silence of an electric engine will increase the safety risks for pedestrians, bicyclists and other vulnerable road users as they may not be aware of the moving vehicle until it is too late.
- In many places, there is a cultural, historic and environmental motivation for planting trees alongside roads. However, one of the most significant factors contributing to fatalities on roads is fixed objects such as trees that are too close to the road and are hit by fast-moving vehicles.
- In recent times, porous asphalt pavement has been used widely to take advantage of its capacity to reduce road noise and to channel rainwater off the road, thus having a positive impact on the environment and road safety. However, there are indications that it may actually encourage motorists to increase their speed, and therefore their safety risks, because the low noise level makes them feel overconfident.

To reduce both pollution and the number of accidents, it is possible to act on the following elements:

- Road vehicles

Table 1 Possible Conflicts and Convergence between Safety and Environmental Measures

		Energy conservation	CO <sub>2</sub> reduction	Air quality	Noise reduction	Landscape	Safety
Road Vehicles	Vehicle weight reductions	+	+	=	?	=	-
	Power reductions	+	+	+	?	=	+
	Limiting maximum speeds	+	+	+	+	=	+
	Electric vehicle	?	+/-	+	+	=	+/-
	Vehicle checks	+	+	+	+	=	+
	Driver training	+	+	+	+	+	+
Transport	Transfer to rail	+	+	+	+	+/-	+
	Intermodal transport in urban areas	+	+	+	+	=	-
Road Infrastructure	Roundabouts	?	?	?	?	-	+
	By-passes	+/-	+/-	+	+/-	-	+
	Noise barriers	=	=	+	+	-	+
	Porous asphalt	=	=	=	+	=	+/-
	De-icing salt	?	=	=	-	-	+/-
Traffic	Reduction in speed limit	+	+	+	+	=	+
	Control of speed	+	+	+	+	=	+
	Traffic calming	+/-	+/-	=/+	+	+	+
	Access restrictions	+	+	+	+	+	+
	Congestion management	+	+	+	-	=	-

Notes: + positive effect as regards objective  
 = no effect as regards objective  
 - negative effect as regards objective  
 +/- effect may be either way  
 ? uncertain effect

Source: OECD

- Transport planning
- Road infrastructure
- Traffic management

Table 1 shows a synthesis of the possible safety- and environment-related conflicts and convergences of various measures.

In general, it is difficult to resolve all conflicts, particularly those between mobility and safety, mobility and the environment, and safety and the environment. In addition, the constant demand for transport efficiency as a central element in industrial and national competitiveness makes resolution of these conflicts even more complex, if not impossible. It is the role of public policy to make decisions on the basis of costs and benefits in order to resolve the problem when all the dimensions of the conflict, including efficiency, have already been identified.

Therefore, to find the best compromise between a safer road system and a better environment, an early evaluation of the impact of road planning on both the environment and safety is required to find solutions that will have the best global results. This will also result in a significant cost reduction by limiting the need to take curative measures to mitigate unexpected effects after infrastructure construction.

### Advantages of integrating strategies

Integrating safety and environment strategies can clearly bring about significant advantages. First, it can increase the benefits of a step that is taken to contribute both to the reduction of accidents and of environmental disturbances. A step seen

to have insufficient benefits in relation to its costs for one of these sectors can improve its standing if the benefits for the other sector are achieved, i.e., the benefits increase while the cost remains the same. Such steps can also gain better public acceptance if their implications are shown in the larger context. For example, several small cities in European countries have focused on the problems of main roads crossing small towns and villages by modifying the road design and immediate surroundings, and by putting up regulatory road signs. Typically, the primary objective is speed and accident reduction but the measures were all the more accepted because they also brought about significant improvement in terms of mitigation of environmental problems, such as noise and isolation of residents.

**Table 2 Possible Integration Instruments and Potential Impact on Safety and Environment Features**

Instruments	Impacts			
	Accident	Noise	Air pollution	Energy/CO <sub>2</sub>
<b>Regulations</b>				
Vehicle standards <ul style="list-style-type: none"> <li>• active/passive safety</li> <li>• size/weight/power</li> <li>• emission (pollutants, noise)</li> <li>• energy efficiency</li> </ul>				
Town and country planning standards <ul style="list-style-type: none"> <li>• density, zoning</li> <li>• construction</li> </ul>				
Infrastructure standards <ul style="list-style-type: none"> <li>• safety improvements</li> <li>• noise</li> </ul>				
Vehicle checks				
Speed limits (type of road/zone)				
Protective equipment				
Control of drunk driving				
Working conditions of truck drivers				
Driver licensing				
Certification of transport undertaking				
Restrictions				
Penalties for traffic offences				
<b>Public Investments</b>				
Roads, Streets (design, surface, roadside)				
Cycle tracks				
Roundabouts, Squares				
By-passes				
Intermodal co-ordination <ul style="list-style-type: none"> <li>• park&amp;ride facilities</li> <li>• combined freight transport</li> </ul>				
Traffic management systems				
Public transport				
Emergency services				
<b>Economic Incentives</b>				
Insurance premiums				
Fines				
Vehicle purchase, Annual road taxes				
Fuel taxes				
Road tolls				
Urban tolls				
Parking charges				
Public transport subsidies				
<b>Communication Management</b>				
Education in schools				
Driver training				
Information campaigns				
Voluntary standards				
Consultation				
Co-ordination between sectors				



*Environmentally safe family transport in Viet Nam  
(K. Fukuma)*

Better optimization can also result if an action contributes positively to one sector but negatively to the other. In this case, as the framework of the decision is enlarged, it is possible to detect actions that deteriorate the conditions of the whole system instead of improving it. Integration is necessary to find complementary action in order to correct the negative effect. For example, if we encourage bicycling in cities in order to influence the modal split and reduce pollution, we have to provide safe conditions for the bicyclists through appropriate safety measures, otherwise the number of injuries will increase due to the bicyclists' vulnerability.

### Actions to advance integration

The main instruments having direct consequences on both the environment and road safety can be based on:

- Regulations laying down technical standards and imposing restrictions on access to operation or to the network—with accompanying penalties—if these standards are not met
- Investment in transport infrastructure and public transport services

- Economic incentives, either negative (taxation) or positive (subsidies)
- Social communication and administrative management to better inform the public about the nature of policies as a means for: (i) gaining greater support; (ii) improving contacts with companies in order to make voluntary agreements; and (iii) expanding co-ordination between safety and environment authorities both locally and regionally

Table 2 shows the effects of these instruments in terms of reducing accidents, noise, CO<sub>2</sub> emissions, energy consumption and air pollution.

While the integration of road safety and environment policies should not create too many technical difficulties, all parties involved must join their efforts in a co-operative process with clearly specified and concrete objectives. The challenge to achieve sound integration will therefore certainly be more on the institutional level. The starting point is in improving communication and dialogue between different public administrations and the competent authorities. There is also a need to strengthen the dialogue with industry and the public in order to mobilize social and economic forces. It is also very important to use market incentives rather than regulations if the integrated policies are to be accepted and long-lasting.

### Future trends

The survey conducted by the OECD revealed that governments are more convinced of the value associated with adopting integrated approaches that lead to cost-efficient measures to meet the challenges posed by high safety and environmental standards while continuing to address critical transport needs. The environmental and safety aspects of transport are closely related, but there are few cases that show a conscious effort to treat safety and environmental objectives within an integrated framework. Some

regions or cities have, however, managed to implement successful integrated programmes. For example, the city of Graz in Austria, initiated a 'Tempo 30' zone with a speed limit of 30 km/h, clear physical indications at the entrances, changes to intersections, and alternate parking. These measures were very well received by the public. Traffic safety showed a major improvement, noise levels fell, and the inhabitants generally considered that the quality of life was increasing. Another example is the integrated study undertaken by the Dutch authorities for the Amsterdam–Utrecht Corridor (Netherlands). Different combinations of actions were considered for transport of people and goods, such as the effects on congestion, safety, lifestyles, and barrier effects, together with overall costs. An optimal combination of actions evolved, consisting of enlargement of both road and rail, as well as enclosing essential parts of the road to strengthen the link between Utrecht and the newly built town.

The OECD research has identified solutions to achieve this goal. The research indicates that in the long-term, it is desirable to embed the integration of road safety and environmental aspects in the broad concept of sustainable development which stipulates stringent demands on the transport system as a whole. In the shorter term, the prime need is to ensure the productive interaction of environmental and safety strategies, while seeking a balance within the larger scope of transport policy. If such a balance is to be achieved, the direction for the development of the integration should take advantage of the following:

- Using overall regulatory and economic instruments to achieve complex objectives, including setting firm targets in terms of accident reduction, noise reduction, air quality improvement, etc.,
- Adopting a transport corridor approach and seeking a holistic solution, includ-

ing decisions about networks of main roads, a growing interest in managing safety and environmental matters for ensembles of facilities along corridors between and within conurbations, often involving multiple jurisdictions,

- Focusing on a strategic approach, especially in urban areas, ensuring acceptable mobility, while taking environment and safety into account, key elements of this approach being, for example, access for all user groups, partnership between authorities and organizations and between the public and the private sectors, and the involvement of the public in strategy formulation.

These conclusions clearly lead to a new area by asserting that safety and environmental issues should no longer be dealt with separately and that integrating policy strategies in these two areas will become more of a necessity. However, there are still some barriers, especially existing institutional problems.

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## Conclusion

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Among other things, the RTR research revealed that this subject is very complex due to a lack of experience in the OECD Member countries and in relation to the associated institutional problems that exist. The results therefore provide a viable start for any country or sector seeking to pursue integration of safety and environment strategies. Most importantly, the results provide an approach for examining the issues surrounding the integration of these policies so that countries can efficiently tailor an integration package that will best serve their specific needs.

The RTR work focused on road transport. However, the motivation for combining safety and environmental policies transcends individual modes and reaches across all areas of transport. The results of the work are therefore relevant to trans-

port at large. In addition, though there is clearly variation among modes as to which instruments are identified and which will have the greatest impact—and therefore should receive the highest priority—several of the instruments remain essentially the same among the modes. The RTR results can thus contribute to the advancement of concepts and proposals for policy integration in other transport modes.

This new concept is an important element for sustainable development. The current transport system is not on a sustainable path because achievements in terms of mobility have, at times, come at a considerable environmental, social and economic cost. In the long term, environmentally sustainable transport requires integration of these concerns in a whole transport policy. The integration of safety and environment considerations is certainly an important step forward towards this goal. ■

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## Notes

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