

**ROAD TRANSPORT, LIVABILITY  
AND SUSTAINABLE DEVELOPMENT  
ROADS AND QUALITY OF LIFE**

Tuesday 21 October 2003 (1.30 – 5.00 p.m.)

**SESSION AGENDA &  
INTRODUCTORY REPORT**

# Session Agenda

**General Introduction: Brief presentation of the ST2 topic and composition as well as national reports synthesis**

Mr. Patrice PARISE (ST2 Coordinator/FRANCE)

**Part 1 : The Road in the core of the human activities**

**1. Road and economic development**

Mr. Ajit B. PAWAR (C4 member/INDIA)

**2. Road and city life from a viewpoint of environment**

Mr. Hirofumi ONISHI (C14 member/JAPAN)

**3. Mobility, road, development and quality of life**

Dr. Pasquale COLONNA (C4 member/ITALY)

**4. Panel Session**

**a) What is the potential impact of the continuing growth of road freight transport on the human and natural environment?**

Ms. Gail MOODY (C19 member/AUSTRALIA)

**b) How to ease the share of the urban roads between the several users?**

Ms. Hillie TALENS (C10 member/THE NETHERLANDS)

**c) What indicators to monitor the economic growth linked to the roads?**

Dr. Mihai BOICU (Secretary of National Committee/ROMANIA)

**d) How are the public discussions to build sustainable roads in developing countries like in Sub-saharian Africa?**

Mr. Soudou DIAGNE (SENEGAL)

Discussion

**Part 2: The necessity to adapt the sustainable development to the context**

**1. Prioritize the stakes and the constraints**

Mr. Pierre SKRIABINE (C14 member/FRANCE)

## **2. The respect of sustainable development requirements in the Via Baltica renovation**

Mr. Juris TAURINŠ (Latvian Road Administration/LATVIA)

### **3. Panel Session**

**a) How to implicate the citizens in the elaboration of realistic indicators to monitor the transport contribution in achieving city goals?**

Mr. Neil DOYLE (C10 member/AUSTRALIA)

**b) How to reconcile road and tourist development with protection of the nature?**

Dr. Haydée ALVAREZ (José A. Echeverría Politechnical Institute/CUBA)

**c) How to integrate sustainable development indicators in planning tools in complement of the cost/benefits analyses?**

Mr. Lars NILSSON (C14 member/SWEDEN)

**d) How can roads improve the quality of life for local communities?**

Ms. Charmaine COLLINS (Austroads/AUSTRALIA)

Discussion

### **Conclusion**

Mr. Patrice PARISE (ST2 Coordinator/FRANCE)

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# ABSTRACT

Today, why are we building roads and how are we to implement projects so that roads will be a vehicle for economic and social development and will be instrumental in enhancing the quality of life?

Sustainable development requires road sector actors to have a responsible, well-reasoned attitude to the long-term consequences of their decisions. To respond to changing needs, the Strategic Theme 2 Steering Committee has been working on the relations between the road and the quality of life, with a view to offering road sector actors in all countries a range of measures and actions to design, build, operate and maintain road infrastructure while preserving sustainable development.

The Strategic Direction Session will be an opportunity to discuss the challenges imposed on the road sector by sustainable development principles. Practices and original measures implemented from one continent to another can be examined, and measures tailored to the political, economic and social contexts of each country or region can be identified.

The experiences presented in the national reports will be compared with the research findings of the four ST2 Technical Committees.

Strategic Theme 2 Steering Committee 2 thanks the countries that replied to the call for national reports: Australia, Austria, Belgium, China<sup>1</sup>, Czech Republic, Cuba, England, France, Greece, Hungary, Japan, Latvia, The Netherlands, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey.

The Strategic Theme 2 Steering Committee thanks the following four Technical Committees:

- C4 Interurban Roads and Integrated Interurban Transport
- C10 Urban Areas and Integrated Interurban Transport
- C14 Sustainable Development and Road Transport
- C19 Freight Transport

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<sup>1</sup> In this report, the time limitation made it impossible to take into account China's national report, which will, however, provide input for the work of the Strategic Theme 2 session

# THE CHALLENGES OF SUSTAINABLE DEVELOPMENT FOR THE ROAD SECTOR

The Kyoto and Johannesburg summits enabled sustainable development concepts and principles to be firmly rooted in the global political scene. Instances of the adoption of national strategies in favour of sustainable development and the inclusion of sustainable development principles in constitutional texts are multiplying and reflect this political awareness. If national sustainable development organisations, councils and commissions are not to be empty shells, policy-makers, economic actors and the general public must be catalysed into thinking and acting in terms of sustainable development.

Roads are often criticized, mainly because they carry and generate motor vehicle traffic, which is the main source of transport-generated greenhouse gas emissions.

At first sight, sustainable development principles may seem to act as a brake on road building. But it would be wrong to think so.

On the contrary, sustainable development must be considered as an opportunity to rationalise and optimise the life cycle of roads by providing solutions to the economic, ecological and social constraints that have to be met by today's roads.

Although the integration of sustainable development into the design and construction phases of road projects adds to their cost, the precise assessment of external road costs gives accurate indicators for comparing alternative transport projects. Efforts to permanently use the maximum capacity of existing roads produce operational gains that make it possible to postpone road widening or to twin the busiest routes for which capital expenditure budgets are not available at present.

Studies to make the road more environmentally friendly by meeting the challenge of using recycled materials have given impetus to research and development programs in the road sector. And social acceptance of road infrastructure has been improved by informing the public of the content of projects and by taking their opinions into account in project design.

# ROADS AND ECONOMIC DEVELOPMENT - APPROPRIATE POLICIES

Today, both research and actual facts highlight the connection between road development and economic development. It is therefore not surprising that the types of road policy adopted in different countries are so closely tied to the development level in these countries.

Whereas the least rich countries (Greece, the Czech Republic, Hungary, Latvia, Mexico, Romania, Slovakia and Slovenia) are implementing policies of rapidly extending their road network to support the necessary economic development, in the most developed countries (Australia, Austria, Belgium, France, Japan, The Netherlands, Spain, United Kingdom and Switzerland) the “Golden Age of roadbuilding”<sup>2</sup> seems to be behind them and they are now aiming for a finer interlinking of their regions.

The division between those countries for which the roadbuilding program is a vital economic priority and those for which roadbuilding is now less urgent is also to be found in road maintenance programs. The former countries have a network in poor condition, often under-designed, and their priority goes to heavy rehabilitation work. The latter have set up regular maintenance practices that enable them to devote more resources to improving the service and quality levels of the existing network.

Among the countries studied in this report, Cuba has an atypical economic situation because it has an atypical economic situation. After seeking to improve communications with isolated mountainous regions, the main aim of the road program is now to provide access to tourist sites, which for this country are a key asset for economic development.

## **Towards accelerated economic development, an infrastructure policy**

The growing demand for transport, increasing car ownership and economic or institutional changes or revolutions are inducing countries in search of accelerated economic development to implement a forward-looking policy for infrastructure development, particularly road development.

### Building a motorway network to sustain economic development

Countries pursuing accelerated economic development need trunk motorway networks that will facilitate increased trading of goods and the mobility of persons. Their priority is to build a network of fast, safe roads between the main economic centres in their countries.

In Hungary, for instance, the liberalisation of the economy has shown the substantial advantages enjoyed by the country’s most accessible regions and the motorway building policy aims to balance regional development by improving communications to the least developed regions.

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<sup>2</sup> c.f. Belgian report



Similarly in the other Eastern European countries an ambitious infrastructure building program is being set up to cope with the transport demand, the through traffic, domestic traffic and spiralling car ownership:

- In 1994, Slovenia launched a program to build a 720 km long motorway network (40% of which was built in 2002). In 2001, Romania adopted a 1,300 km long motorway program estimated to cost 7.5 billion USD. The Slovak road policy also aims to build a motorway network able to carry the increased traffic;
- Greece has clearly stated that its priority is “the quantitative development of transport infrastructure”. 860 km of roads were built there from 1998 to 2002 and 2,250 km are planned for the 2003-2008 period;
- On the American continent, the situation in Mexico is similar. The Mexican government has concentrated on investing in the building and modernisation of the main arteries and has committed 58% from the 1.5 billion USD annual road budget.

These intensive road policies in countries where road transport is already the predominant mode – despite an infrastructure equipment rate lower than that of the developed countries – is not conducive to the rebalancing of transport modes. This consequence in urban areas is pointed out by Slovakia, as between 1990 and 1999 in Bratislava, road traffic increased by 84% whereas public transport fell by 25%.

#### Building roads to facilitate regional integration

For the Eastern European countries (Czech Republic, Hungary, Latvia, Romania, Slovenia, Slovakia), the road policy is the means to make integration into the European Union territory a reality – by connecting up the major trans-European routes and adapting road design to European standards.

#### Building roads to improve the quality of urban life

The roadbuilding policy also aims to improve urban living conditions by separating through traffic and local traffic.

Priority is given to urban by-passes in Romania, transfer of through traffic onto the motorways in Hungary, by-passes of large cities on the Via Baltica in Latvia, congestion relief of large urban centres in Greece and the building of ring roads in Mexico.

#### Building roads to enhance road safety

The rapid increase in the car ownership rate is resulting in a high growth of road accidents. The government is responding by building safer, better quality roads.

Mexico with 13,000 fatalities per year (for 100 million inhabitants) has evaluated the economic cost of accidents at 1.2 billion USD, which is 0.3% of the GDP.

## Strengthening the existing road network

Because many countries have lacked sufficient funding for regular maintenance in recent years, their national networks are dilapidated and unable to carry the increased traffic. Furthermore, for the Eastern European countries, much of the through road network must undergo redesign work to meet the European standard of 11.5 T per axle.

Slovenia estimates that 25% of its secondary network is in very poor condition. Romania considers that 62% of its network is in poor condition or obsolete and is considering the possibility of introducing a tax on oil products to support a road maintenance fund. Slovakia is also implementing a renovation policy on national and county roads to improve their technical performance. During the first phase of the Via Baltica project, Latvia renewed 71% of the road surface on this route and strengthened eight engineering structures. Between 1998 and 2001, Mexico also renovated its 14 main arterial highways, over a length of 19,000 km, at a rate of 200 to 300 kilometres per year, which reduced the percentage of roads in poor condition from 20% to 15%.

*This shows the similarities between road policies in developing countries, whether in the Eastern European countries, the Mediterranean countries or those of the American continent. This policy of accelerated construction and rehabilitation calls to mind the policies implemented a few decades ago in developed countries.*

## In developed countries - a service policy

Developed countries are no longer conducting a road building policy comparable to that of twenty or thirty years ago. All the countries that now have the highest road densities implemented an intensive road building policy after the Second World War to achieve a primary trunk motorway network.

Today, as Japan puts it, these are countries which “in the full maturity of a global approach [must] seek to build a community able to maintain itself rather than aiming for rapid growth”. They no longer reason in terms of investment and infrastructure development so much as in terms of service rendered to users and the general public.

## Towards refined land use planning

In these countries, the concern for balanced land use planning and accessibility is key to the road building policy.

The Belgian land use planning policy aims to increase accessibility while reducing travelling requirements. This entails developing activities near existing roads rather than building roads to develop activities. Under this policy, intermodal hubs are being built for freight, and in urban areas, city centres are being redeveloped.

In Switzerland, road building is dedicated to achieving regional balance and economic development. In the 1960s, Switzerland launched a motorway program, 90% of which has been completed to date. The first roads to be built connected up the big cities to promote economic development whereas today, the aim is to connect up outlying areas to strengthen national cohesion and achieve balanced planning and regional economic development.

Australia must meet the challenge of developing a huge territory divided up into coastal metropolitan areas separated by vast sparsely populated hinterland areas. Roads must therefore link up remote economic centres while providing access to isolated communities.

In Spain, the construction of express roads meets a need for country-wide road networks to link up large metropolises without passing through Madrid.

Japan's international trade is carried out mainly by sea and it has therefore integrated its roadbuilding policy into an intermodal transport policy by improving links between ports and roads.

In France, the long-term road policy is based on Service Schemes, which aim to define the services that infrastructure must provide to the public, with a view to controlled economic development and land use planning.

### Towards a more free-flowing network

The negative impacts of road saturation on the economy, on people's quality of life, public health and safety are today some of the main reasons why countries with dense road networks are continuing to build roads, because the development of alternative transport to roads does not appear to be the most cost-effective, efficient or rapid solution to the problem.

In Belgium, for instance, roadbuilding now consists mainly in widening saturated roads and improving traffic flow at black spots.

Switzerland proposes to widen its overloaded roads from four to six lanes to limit increasing traffic congestion in its large metropolises and on some sections of the Swiss plateau and its Alpine regions.

In France, to overcome traffic congestion on city ring roads, which carry both local and through traffic, the plan is to build major by-passes to separate the two types of traffic, with a limited number of interchanges so as not to accentuate urban sprawl.

In Spain, the toll motorway-building program aims to twin congested express roads.

The United Kingdom has expressed this concern explicitly "The aim of the United Kingdom is to tackle road congestion and pollution resulting from increased traffic congestion levels".

### Towards a better integrated network for the benefit of all citizens

The automobile has long been at the centre of policy thinking on road building. Countries with high road densities are now challenging this line of thought by seeking to balance the benefits of roads between the different users.

Social acceptance of new projects involves better integration of roads to upgrade the image people have of roads and increase their satisfaction.

Roads must promote economic development without degrading the quality of life. They must meet not only automotive needs but also people's needs, particularly in urban areas.

In Belgium, attention is no longer focused on extending the network but on reducing nuisance (particularly noise and environmental nuisance), improving safety and optimising the operation of existing roads. Road projects are integrated into an overall transport perspective. For example, roadbuilding also means facilitating public transport to enable it to run in exclusive rights-of-way.

France is talking of adapting roadbuilding to the different types of traffic and users. "With economic development and increased car ownership, it has suddenly become necessary to move towards increased specialisation of the road links that make up the road network."

Japan is introducing walkways and cycleways on urban roads to enhance the quality of urban life. The aim is to "move from car-oriented measures to an approach that gives more importance to pedestrians and cyclists in urban areas". To reduce noise nuisance, Japan intends to lay more low-noise surfacings, build noise barriers and provide subsidies for local inhabitants who carry out soundproofing. Operating measures are also being considered, such as a "green toll" – modulated pricing that would encourage motorists to use routes that are longer but pass through less urban areas. The burying of cabled networks, the creation of new rest areas provided with good-quality plantations and the development of roadside plantations, are all solutions found by Japan to integrate the road into the natural environment.

Austria's report on the enhancement of quality of life in city centres recommends replacing the car by people as the benchmark for development of urban transport projects because today "the city has become a slave to the needs of the car".

## Safety and quality of service

Work on the existing road network aims to reduce internal and external costs of operating road links while improving the quality of service to the user.

In France, much work has been done to ensure safety is taken into account right from the design phase of new projects and to improve safety on already-existing roads. The improvement of the service level is the result of adding new facilities, such as rest areas, or information to users, and setting up intelligent systems that inform users of traffic conditions in real time.

In Japan, operating systems and maintenance and management work aim to improve traffic and safety management: reduce traffic jams by developing Intelligent Transport Systems, eliminate intersections by elevating rail tracks or roads, separate car traffic from public transport by building dedicated rights-of-way, introduce natural risk management on the roads, and reduce road life cycle costs.

In Spain, the increase in safety on already-existing roads is an aim set out in the 2000/2007 Infrastructure Plan.

Australia has adopted a national road safety strategy (2001-2010).

In the United Kingdom, road hazard control is still a priority for the country's Road Administration. The new road safety plan "Tomorrow's road – safer for everyone" sets out the goal of a 40% reduction in the number of people killed or severely injured by 2010.

*In developed countries, road policy is no longer concerned with the rapid expansion of infrastructure but with its integration into a more general sustainable development policy that gives greater importance to quality of life and to the service offered to the public by road infrastructure.*

# THE ROAD, AN INTEGRAL PART OF HUMAN ACTIVITY

Both historians and philosophers testify to the strong link between mobility, freedom and human activity. Today, the impact of roads on human activities is recognised and asserted, whether through the bandwagon effect on the economy, the structuring effect on the territory, or the effect on people's ways of life through accessibility to neighbourhood services.

To control this impact, governments are implementing medium and long term planning of road infrastructure at national level.

However, this impact is difficult to measure for lack of reliable indicators.

## **The positive impacts of roads**

### Economic development

Economic development is the first positive impact of road construction. All actors in the political and economic world agree on this point, even though no specific theoretical tools are available to measure the impact of road infrastructure on economic development.

In Switzerland, peripheral road links have ended the social and economic isolation of remote regions, thus stimulating an increase in investment in these regions. In Cuba, roads are having a positive impact on the economy, mainly through the development of tourism and agricultural production. Japan considers that roads are enabling an "increase in living environments".

France has conducted studies on the effects of motorways on regional activities. The positive effect on the development of tourism is clearly demonstrated. The economic impact of the road network is stronger in départements (~ counties) where production densities and levels are low or moderate. Although it has not been demonstrated that road infrastructure has caused businesses to become established at the inter-county level, they have clearly opted to locate on sites that have better accessibility. Companies asked about the comparative attractiveness of European countries consider that good road infrastructure is an asset for establishing activities in France.

It is a highly complex matter to account for the externalities of the road and its impacts on human and economic activities. However, it is possible to use fairly simple indicators to assess the direct impact of roads on some components of the economy.

The Romanian report, for instance, gives the example of an analysis of a road section before and after rehabilitation. To estimate the impact of this rehabilitation on local economic life, Romanian experts counted the number of motels, service stations, restaurants and car parks along the roads. Based on these simple data, it is easy to estimate the number of jobs or the added value generated by these establishments, which are part of the direct contribution of the road to the development of the tertiary sector.

## Increase in the car ownership rate

The increase in the car ownership rate is considered by some people as a negative impact because of vehicle-generated nuisances. But that overlooks the fact that these nuisances are abating considerably owing to the technical progress of the car industry, and above all, that car ownership is often synonymous with mobility, individual freedom and quality of life, by providing everyone with quality space, whether in terms of basic amenities (access to resources, health facilities or educational facilities), professional life or leisure.

## Improvement in sanitary conditions

The impact of roads on public health is a debated point. It is recognised that when a new road has been built, the diversion of traffic from nearby roads and the decrease in traffic jams reduces the impact of pollution and consequently nuisance on health. But this improvement is offset by nuisances from the new traffic generated by the new road.

Australia gives the example of the direct health benefit related to the construction of a road. Australia has undertaken to build a road on an island where, in the rainy season, the existing earth road was muddy and retained water which stagnated and thus led to the development of disease, whereas the rest of the year, it was dusty and caused respiratory diseases. The construction of a road with a central invert transformed this road into the island's main drainage system and thus reduced the rate of infection due to these diseases caused by mud or dust. Furthermore, in a more anecdotal vein, it gave the young people on the island a roller skating track.

Last but not least, particularly in developing countries, the road improves communications and thus improves access to health facilities (hospitals) and resources (water).

## Environmental improvement

The United Kingdom's report takes an original approach as it reviews the positive impacts of road construction on the environment: "by creating natural reserves, improving land maintenance and meeting drainage requirements".

Studies in France on the fauna and flora around motorways have yielded similar results.

## **Negative impacts of roads on human activity**

The impact of roads on human activity can also have negative aspects. The national reports highlight two major problems: that of consistency between infrastructure and urban planning and that of road safety.

## Hyper-urbanisation or urban sprawl

It has become essential today to integrate infrastructure and transport into the broader concerns of urban planning. For owing to a lack of such upstream analysis and reflexion in some countries, unsatisfactory urban forms are emerging.

In Japan, for instance, which is a hyper-urbanised country, priority has long been given to building major radial arteries without sufficiently developing transverse highways in the urban areas. This has caused urbanisation to spread along these arteries which are used as urban avenues, whereas that was not the intention when they were designed. Under-designed walkways cannot consequently ensure the safe movement of pedestrians and cyclists who have to zigzag between the electricity and telegraph poles.

Switzerland is having to deal with a substantial growth of urban sprawl caused by a combination of steady improvements in the linking up of urban fringe areas and increasingly difficult access to city centres due to the saturation of urban entry and exit roads.

### Increase in numbers of accidents and decline in use of public transport in Eastern European countries

The economic and social priority given to cars has led to a sudden increase in car ownership and road traffic, particularly in developing countries. Slovakia's report demonstrates the place carved out by the private car in this country: "Car ownership has become a status symbol for some social groups and an urgent need for the exercise of some professional activities".

In this context of growth in transport demand, development of the road network has not enabled a satisfactory road safety level to be maintained. The Czech Republic, for instance, has had to cope with a 163% increase in the number of accidents on its roads over the past ten years.

The increase in car ownership has also led to a decrease in the use of public transport. The Slovakian report thus estimates that in the period from 1990 to 1999, car traffic increased by 88% while that of public transport fell by 25%.

The loss in attractiveness of public transport is regrettable in terms of sustainable development objectives.

## **Measuring and controlling impacts: planning and assessment tools**

To manage or control the impact of road infrastructure on human activities, countries are acquiring planning and assessment tools.

### Planning tools

Most countries, whatever their development levels and their administrative and political structures, have set up nation-wide road planning systems: a five-year road development plan in Japan, a national road scheme in Cuba, a national plan for countrywide road development in Hungary, service schemes in France, an infrastructure plan in Spain, motorway plans in Slovenia and Switzerland, planning policy directives and a network strategy in the United Kingdom.

This planning aims to take into account or achieve optimum control over the impact of road infrastructure on human activities. It also gives the actors of a country's economic, social and political life the means to implement medium and long-term strategies.



The main national strategic guidelines are logically set out in regional plans. But from one country to another, depending on the organisational structure of their institutions, the degree of federalism and decentralisation, and their administrative and political structures, there are considerable differences in the degree of autonomy granted to regional entities to develop their regional planning tools.

Municipalities tend to be largely autonomous in their infrastructure and transport management. But this autonomy is sometimes limited by local resources, particularly in terms of technical skills and expertise.

The interaction between political, economic and social actors and the road planning processes is naturally key to controlling the impact of road infrastructure. That is why these actors are increasingly involved in consultation as soon as the planning documents are drawn up.

This consultation is facilitated at the municipal level, which is the easiest level for consulting the public directly.

## Examples of assessment tools and criteria

The most common assessment tools are cost-benefit analyses associated with impact studies.

The hierarchical grading of criteria (the weight given to each indicator) in these cost-benefit analyses and the importance given to these studies compared to other political criteria enable decision-making methods to be matched to the regional, social and economic context.

It is thus shown that in countries where infrastructure is an urgent economic necessity, these cost/benefit tools give great importance to economic development.

In the Republic of Slovakia, road project assessment is based on two main criteria: environmental impacts and return on investment.

Hungary is developing modelling of the impact of road development on the urbanisation process based on different indices: changes in real estate prices, job creation, increase in landfill areas, numbers of companies, changes in gross sales of these companies. The cost/benefit analysis is not performed systematically for each project assessment. Regulations are being drawn up to enable the National Administration Institute to rule on projects that require a cost/benefit analysis. The paramount criterion is that of traffic demand but criteria concerned with national defence, the environment, health and tourism are also used.

Conversely, in the most developed countries, the use of these types of tools is being further developed and refined. These studies are being adapted to increasingly take into account criteria relating to environmental protection and sustainable development.

In Japan, for instance, the Directorate of Roads has set up a commission for assessment guidelines on road investments. Regulations adopted in 2001 stipulate that an a posteriori assessment of completed projects must be carried out to ensure that the project has achieved the economic, social and environmental goals set.

In France, assessment of the merits of a project is based on an estimation of costs and benefits (internal rate of return, discounted benefit per invested Euro) and impacts (on the environment, the cultural and tourist heritage, agriculture, urbanisation and human activities) for different scenarios of economic growth, traffic trends and transport policies. This study is made in an intermodal perspective.

In Spain, after public consultation, a multicriteria analysis taking into account factors that are economic (investment and profitability), functional (traffic capture, safety, alignment), environmental and land-related (land use, influence of other transport modes) is finally sent to the Ministry of the Environment for the Declaration of Impact on the Environment. If the Declaration of Impact on the Environment is unfavourable, the Council of Ministers can decide in the last resort.

In Australia, the criteria used to estimate the advisability of building new road infrastructure are as follows: economic consequences (time savings and project cost), project externalities (noise, traffic jams, safety, pollution) and the environmental impact (tons of CO<sub>2</sub> generated).

Lastly, there are three particularly original examples in Switzerland, Sweden and Austria:

- Austria gives the example of project assessment in urban areas: urban projects are assessed according to their capacity to increase the quality of life in urban centres;
- Sweden has set up a research project on a planning tool that defines objectives on the basis of the natural and cultural protection level, social cohesion, and the regional development desired for each project. This will enable sustainable development indicators to be integrated at the project design stage;
- In Switzerland, each project option is assessed according to socio-economic criteria such as travel time savings, vehicle fixed costs and variable costs, improved accessibility, and road facility levels. Each project option is then submitted to local organisations, which rate them. The weighted sum of the ratings gives the order of preference of the project options. Switzerland is also drawing up an assessment method that puts sustainable development criteria (social solidarity, economic efficiency and environmental protection) at the centre of the conventional cost/benefit analysis.

Assessment and planning tools enable road network project owners to measure and control the impact of road infrastructure on human activities. These tools must be adjusted to the specific needs of each region, to serve the country's economic and social policy.

*The replies to the call for national reports show how difficult it is to estimate all the impacts of roads on human activities. No efficient, comprehensive models appear to be available. However, partial models have been developed.*

# ROADS AND THE PUBLIC

Infrastructure in general and roads in particular are different from other fields owing to the importance of funding resources, the multiplicity of skill requirements, the extent of projects in space and time and their implications on daily life and macro-economic life. This may explain everyone's sensitivity to road-related problems – which may take the form of enthusiasm or rejection.

This is a subjective area in which the division is again apparent between countries with an infrastructure deficiency where the aim is to improve and develop the road network, and countries where the road network is already well developed and roads are often considered as nuisance factors.

## **Roads, an economic development tool**

In countries in the throes of economic growth with rapidly expanding road networks, such as the Eastern European countries, Mexico, Cuba or Turkey, the public are usually in favour of road building, which is considered as a tool for economic development.

In Slovakia, the network is considered inadequate by the population, and people are not against major road projects although they require them to be environmentally friendly. In Romania, roads are not criticised but are considered to be in the public interest while in Cuba, because there is little traffic, roads are not perceived as sources of nuisance.

This perception can be compared with that prevalent in the 1990s in Japan, where roads were considered as real tools for economic revival in a Keynesian public policy context.

## **Roads, a social development tool**

Because roads can open up isolated regions and facilitate balanced land use planning, they form a tool for social development. Accessibility to educational facilities, health facilities, jobs, the carriage of goods to isolated regions – these are all factors of fundamental social progress.

The Australian report sums up the social efficiency of roads: In the Queensland region, it is recognised that roads have major social benefits and enable equality of opportunities to be converted into equality of results.”

## **In developed countries, utility is being questioned vs nuisance**

In countries where economic and social development is a fact, road opponents are questioning the benefit of the considerable investments required by roads. They put forward the nuisances caused or assumed to be caused. The most often condemned nuisances are noise, air pollution, greenhouse gas emissions and, paradoxically, traffic congestion.

The Belgian report illustrates the discontent that reigns where road projects are concerned. Since the end of the 1970s, major motorway projects have encountered increasingly hostile reactions. It thus took twenty years to build the last 45 km of the Brussels-Lille motorway. Powerful lobbies have developed out of associations and a “virtually generalised rejection of roads” now pervades the scene.

A similar phenomenon is building up in France and is often amplified by the media which in response to opposing associations “often act as a resonance chamber that amplifies protesting reactions without giving the silent majority the right to speak.” Politicians have a less cut-and-dried opinion as they are torn between local residents’ opposition to a project and the positive impact for their constituency as a whole. In France, the problem of co-existence of the different road users is also expressed, with pedestrians and cyclists complaining about motorists who in turn complain about lorry-drivers.

In Japan, public discontent has invaded the legal scene. A number of legal proceedings brought by local residents close to busy motorways have been won by the plaintiffs and now form precedents. People are wondering whether the measures taken in response to problems (particularly those of congestion) are adequate. In this country, criticism of roads forms part of the “general discontent with the public services whose action is considered too slow”.

It is important to note that although roads are usually overwhelmingly approved in developing countries, opposition to road projects is increasingly being heard there. In particular, ecological schools of thought are gaining strength in the Eastern European countries. These countries therefore face a difficult situation, with both a great need for road infrastructure and increasing constraints as regards social acceptance. Note that these problems are amplified by the absence of legal provisions for expropriation owing to the change in the political regimes.

# ROADS AND SUSTAINABLE DEVELOPMENT

## Public stakeholders in sustainable development in the road sector

The information provided by the different countries shows how difficult it is to set up a simple administrative organisation on such a complex problem as sustainable development, which involves so many actors and responsibilities.

The available information does not enable us to really measure the autonomy of local authorities with respect to the central authority and to determine the exact role of the Ministry of the Environment in the decision-making process, even though this Ministry is put forward by many countries as the guarantor of sustainable development procedures.

Below are country-based descriptions of the main institutional bodies involved in integrating sustainable development into road projects. Note the similarities between the Eastern European countries, which stem from the deep-rooted reforms of their administrations together with the liberalisation of their economies in the early 1990s.

- Slovakia: The Ministry of the Environment conducts the environmental impact studies. Up until 1990, project planning and development were centralised in large design offices specialised by project type. Since then, these activities have been decentralised and the number of small private consultant firms has soared.
- Romania: The Ministry of Public Works, Transport and Housing, through its National Road Administration, which has the technical expertise and is developing planning tools, also has expertise in the ecological aspects of road projects. The County and Local Councils manage the county roads and local roads respectively. The Professional Road Engineering Association contributes to the training of specialists. Domestic and foreign financial institutions draw on their experience gained in other countries and on the selection of projects for their cost-effectiveness to influence project content.
- Slovenia: Today's main actors are the Ministry of Communications, the Ministry of Finance, the Ministry of Culture, the Ministry of the Environment and the Ministry of Agriculture. With the country's access to independence, organisation of the road sector has undergone a real reform over the past ten years. The public "Road Companies" that carried out road maintenance have thus been privatised. A State-owned motorway has been set up: DARS (land acquisition, financial arrangements, selection of builders and maintenance). Note that the Ministry of the Environment is in charge of defining the road alignment, which is then submitted to the approval of Parliament. Some of the Directorate of Roads technicians have been seconded to a public company, DCC, which carries out project engineering.

- Japan: Japan has called for the launch of the five-year program in 2003 to be accompanied by a reform of the Road Administration, the guiding principle of which is “transparency”. The Ministry of Transport will thus undertake to assess road project development annually according to goals set every five years. These results will be made public (via the Internet and other media). The Administration has also set itself a maximum period of fifteen years to complete each project. Flexible standards specific to the features of each region will be introduced and there will be a new delineation of roles between the State and the regions.
- Switzerland: The Federal Council, the Federal Authorities, the Cantonal Parliaments and the Cantonal Authorities are involved in road projects but “the distribution of tasks and responsibilities between the Federal and Cantonal Authorities is fairly complicated and is being called into question”.
- France: Decentralisation is now in progress in France, with a redistribution of responsibilities towards the Local Authorities. This decentralisation will enable sustainable development problems to be addressed at new local and regional levels. Service Schemes have been drawn up after thorough consultation with the Regions.
- Belgium: The design of mobility plans is performed in consultation with the Environmental and Urban Planning Administrations, the Provinces and the Communes.
- Spain: The National Climate Commission has assessed the effects of the Infrastructure Plan on CO<sub>2</sub> emissions. The environmental impact study is conducted by the Ministry of the Environment, but it is possible for the Ministry of Public Works not to follow the recommendations of this study and to appeal to the Council of Ministers to enforce its alignment.

## Public debate

In the context of increasing rejection of road projects by local residents and environmental protection associations in developed countries, the Administrations in charge of road infrastructure development have built up their consultation policy with these new actors. They have thus studied:

- the point at which consultation must take place in the road project development process to enable it to be of the greatest value,
- the integration of consultation not only into the project design phase but during its construction,
- the consultation methods that guarantee real opportunities for constructive discussions.

## Enlarged upstream consultation

If public debate is to have any real impact on the design of a road project, it must take place at the earliest possible stage.

In Hungary, for instance, the people's opinion is taken seriously right from the project design phase. In 1997 in France, a National Public Debate Commission was set up. This body, under the authority of the Ministry of the Environment, must ensure that the public are involved during the development of a project and that the public are informed during the project construction phase. The National Public Debate Commission can be called upon to decide on the merits of the project itself, upstream of the alignment studies. In Spain, the project is submitted to the public opinion before the environmental impact study is launched.

And consultation is not limited to the elected representatives. It can involve local residents and environmental protection associations. The media are also powerful relays of these consultation forums, particularly when there is strong opposition to the project.

### Consultation throughout the project

In Belgium, intensive communication activity is implemented as soon as a project begins and the consultation and participation phase lasts throughout the project. Japan, in its ambitious road reform policy for more transparent management is considering closer partnership between Local Authorities and the Road Administration. Public opinion will thus be taken into account right from the design phase. The Japanese government also aims to develop a road management method in which the general public will participate. Interaction with the public will also be encouraged through the creation of an office within the Administration, in charge of investigating the level of public satisfaction, handling complaints and giving advice. Japan is thus meeting the difficult challenge of accelerating project completion time while introducing more consultation.

In France, consultation phases are scheduled at each stage of the study process as the project progresses.

### Projects submitted to the decision of local bodies

For public debate to have a genuine impact on the project, it must epitomise local democracy. In Belgium, local authorities have real powers, since projects in built-up areas are usually submitted to the approval of local authorities and consultative councils. For instance, the Flanders plan took people's views into account through advice requested from representative panels. In Brussels, every major road project is submitted to the Regional Mobility Council and to the Monuments and Sites Commission.

Another example is in Slovenia where the local Commune must approve the alignment before it can be validated.

## The darker side of consultation

Some national reports pinpoint dysfunctions that must be minimised if the future of public debate is not to be discredited.

In Switzerland, the non-road sector actors are environmental protection and user defence associations, and professional and local associations. The people and association concerned are closely involved in the road project design phase. If consultation is carried out indiscriminately, it may not only slow projects down but also cause “priority to be given to private interests vs the general interest”.

In France, the involvement of environmental defence associations has been intensified during the road project design phase. And the press will often relay their opposition to a road. Because of this opposition, regulations have been changed to enable defence associations of local residents and the environment to participate in the public debate. However, this public debate has not yet given rise to any real discussions as all too often, the road opponents defend extreme positions. Changes in the regulations have opened up new possibilities for legal proceedings and thus introduced a new profession into the road field – the legal profession. This new situation has weakened the image of the State and its representatives, who tend to be presented by project opponents as advocates of the road option and not guarantors of the general interest.

In Spain, the leading opposition groups are the ecologists, farmers and landowners. Recent debate on roads has shown that the interests of these three groups are not easily reconcilable. That is because farmers are concerned by land use and the possibility that a motorway will pass through their land, ecologists by environmental damage and landowners by noise nuisance and air degradation. Ecologists consequently want the road alignment to pass through the most urbanised zones whereas the other two groups want to push back the alignment to areas where human presence is less extensive. In this case, instead of optimising the road alignment by integrating everyone’s views, the consultation may turn into a fighting arena and plunge the project into deadlock.

## Technical measures

Sustainable development will also be taken into account through technical measures, at the forefront of which are environmental protection measures (water, air, fauna and flora), which have been developed and implemented for a number of decades.

The national reports highlight many other sustainable development measures: recycling and road safety programs, promotion of intelligent transport systems, integration of road development into a general transport study, optimisation of road management, energy management or the hierarchical grading of projects based on new criteria.

## Environmental protection

In all the countries, an increasing share of projects costs is devoted to limiting the environmental impact of road construction.



Road designing is steadily becoming subject to a series of environmental protection laws – on water, noise and air – and the countries that have had to get to grips with these concerns for a number of years have introduced the necessary methods and techniques.

### Air protection and the fight against climatic warming

Air protection measures aim to reduce particulate matter emissions (PM) and NO<sub>x</sub> whereas measures to counter climatic warming endeavour to limit greenhouse gas emissions (CO<sub>2</sub>).

In Japan, it is planned to reduce PM and NO<sub>x</sub> emissions by facilitating the free flow of traffic and introducing “green tolls” to encourage motorists not to travel on residential roads but on circumferential roads. The third program of measures to alleviate traffic jams (1998-2002) has just been completed.

In France, measures stipulated by the National Plan to control climate change and by the Kyoto Protocol are integrated into Service Schemes, which are long-term infrastructure planning schemes.

In the Netherlands, several national plans aim to reduce emissions of NO<sub>x</sub>, SO<sub>2</sub>, PM and CO<sub>2</sub> by 2010 in accordance with European regulations.

In Australia, a National Greenhouse Strategy has been introduced. And Australia has been experimenting a highly innovative policy to tackle traffic congestion. Instead of counting solely on ITS development to optimise network management and inform users of traffic conditions, some municipalities have been testing out a voluntary user behaviour change program to reduce the part played by the private car in transport. This program, called Travel Blending in the city of Adelaide, encourages people to keep a daily travel diary to give them food for thought on how to organise their movements. A reduction of between 6 and 17% in terms of vehicle kilometres has been recorded in the participating households while at the same time travel by public transport increased by 10 to 23%. The program, called TravelSmart in Perth, led to a 14% reduction in the number of vehicle kilometres. Studies are being carried out to extend this type of program to the entire country.

In addition, car manufacturers have made, and are still making, considerable progress in reducing vehicle pollution.

But in some countries, there is so much air pollution that in the short term, the only efficient solution is to restrict vehicle movements. This measure is in force in Mexico, where vehicle licence numbers determine the travel days authorised for each vehicle.

Similarly, one of the solutions put forward in the Austrian report to bring a new quality of life into city centres is to restrict car traffic.

### Blending of roads into the landscape

Road opponents often criticise the poor integration of roads into the landscape and their irreversible character once the infrastructure has been built. Further effort is required to achieve optimum blending of roads into their surroundings.

To meet this expectation of the public, the Road Administration in Japan gives priority to alignments that limit the visual and ecological impact of the road and re-create a biotope along the roadside by planting plant species. A program to bury telecommunication wires is underway in urban areas and special attention is paid to the rehabilitation of urban roads that are too “roadish”.

In France, 1% of the value of national road projects is devoted to enhancing the landscape, and landscape architects are involved during the design and building of motorways and national roads.

### Noise abatement

Noise is one of the most often condemned factors affecting the quality of life. The United Kingdom’s report points out that “noise contributes to sleep deprivation and affects the performance of schoolchildren, and that noise-induced stress may increase risks of coronary heart disease and psychiatric disorders”. With urbanisation along the busiest roads, a great number of people have become exposed to noise nuisance.

Compensatory measures are now mainstreamed into the design of new projects and there are programs to reduce noise exposure for people in many countries. This demonstrates the road actors’ awareness that the treatment of noise nuisance is now a priority.

The installation of noise screens is written into the “Contrat d’Avenir”, the contract for the future, a strategic transport plan for Wallonia in Belgium. Switzerland has undertaken a vast noise screen construction program.

Other research work is being carried out which aims not so much to limit people’s exposure as to reduce traffic-generated noise. After the commitments of car manufacturers to reduce engine noise, expectations now concern the reduction of rolling noise. For instance, in future, the Netherlands will focus their efforts on lower-noise tyres and surfacings (double layered asphalt concrete).

The Czech Government, to socially justify its road planning policy, bases its argument on the fact that the diversion of traffic from urban roads through the construction of the motorway network, will reduce the inhabitants’ present exposure to noise nuisance. The Czech Road Administration limits the number of inhabitants within a 500-metre strip along the new motorways.

## Grading projects according to their economic, social and ecological consequences

Sustainable development policies have a cost. And as the Swiss report points out, in a context of reduced funds and increased costs, “transparent prioritisation of road projects has become a hard fact.”

Whereas road project programming in countries in the throes of economic development is guided primarily by a concern to build trunk roads as quickly as possible, in more developed countries, the project programming criteria are less cut-and-dried.

The new Japanese five-year program illustrates this change in attitude from “quantitative development” to “strictly selected investments and the development of existing facilities”, and from “assistance for consistent, harmonious country-wide development” to “customised regional development” and the transition from a “preliminary assessment system that aims to achieve project volume” to a “results-oriented assessment system”.

In Slovakia, environmental impact studies are now compulsory for new projects.

In Australia, a National Strategy for Ecologically Sustainable Development was implemented in 1992. This strategy was revised in 1999 and initiated the creation of a tool to assess progress in integrating sustainability principles into network planning, design, building, operation and maintenance.

In Belgium, reorganisation of the Road Administrations was undertaken by introducing a quality approach, external audits, a policy by objectives, and strategic plans.

## Resource management and recycling programs

Sustainable development entails the management of natural resources and waste. Through the recycling of materials, roads are now able to absorb not only some of their own waste but also waste produced by other activities.

For instance, the Netherlands encourages the use of waste and concrete rubble, phosphorus-based lacquer or clinker in road construction.

## Transforming the road into a sustainable energy source

In the Netherlands, it is proposed to use the road as a source of sustainable energy. In this country, research work is being conducted on the possibility of associating solar panels with noise screens or storing the heat built up by road surfaces during the summer months. It would be particularly beneficial to use this energy to warm the road, and the homes of nearby residents, when there is black ice or snow.

## Enhancing road safety

All countries are faced with the challenge of reducing the number of road fatalities. Road accidents are caused by one or more failures in the infrastructure-car-driver triangle. Measures to make roads safer by eliminating the most dangerous points (sharp bends, level crossings, hazardous sections, etc.) are one of the levers available to the public authority to meet this challenge.

For instance, Turkey’s national report sets out the traffic safety improvement program introduced in 1998 (for the sum of 90 million USD, co-financed by the World Bank). One of the components of this program comes under the responsibility of the Turkish Directorate of Roads, in that it aims to list the “accident black spots” along the network and then to address them. This program has enabled 241 accident black spots to be addressed from 1998 to 2002.

In Mexico 2.4 million USD have been invested in the improvement of more than 700 black spots and in 2002, 2 million USD were used to improve 204 black spots.

In Switzerland, the Federal Council adopted the fundamental principles of an ambitious road safety policy: "Vision Zero".

## The introduction of ITS

Although Intelligent Transport Systems (ITS) do not directly affect the environment, they promote safety and facilitate traffic flow (user information, electronic fee collection) thereby reducing pollutant emissions and optimising road management (traffic control centres). These operating measures, by enabling a better use of existing networks, can avoid a build-up of road investments.

ITS systems, by offering a range of technical measures to rationalise road network operations, are an efficient means of mainstreaming roads into sustainable development. These technologies require costly initial investment and they were therefore initially developed in the richest countries. However, ITS implementation in Mexico and the creation of an ITS association in 2001 in Slovakia show how these technologies have expanded within a wider circle of countries.

## Integrating road development into general study and discussion on transport

To conduct a sustainable development policy in the road sector, it is necessary to analyse the interaction between road, sea, rail and air projects. Transport modes must no longer be tackled as competitive modes but as complementary modes.

This is the roadbuilding approach in France with the new Service Schemes, or in Belgium with the Brussels or Wallonia Mobility Plans, which in parallel with road planning, integrate programs to improve public transport, develop cycling and pedestrian mobility, reduce HGV traffic and provide parking plans.

## Optimising road management

Sustainable development principles are inducing public authorities to take full advantage of their infrastructure, avoid wastage and rationalise road building, operation and maintenance. This concern is particularly important in countries where opponents to new road projects are most numerous.

This may mean, as in Japan, a maintenance policy guided by the concern to maximise the infrastructure life cycle.

Belgium and the Netherlands also point out that maintenance or building work must be programmed so that they cause the least possible disturbance of operations in the rest of the network.

To meet these network management optimisation objectives, the United Kingdom has developed a Route Management Strategy (RMS) to "provide a management structure of the main individual routes forming part of wider transport networks". 19 RMS strategies are being drawn up and 50 more will follow over the next two years. On the basis of each RMS, a ten-year strategy will be adopted in parallel with a three-year investment plan. "The main aim of today's road policy in the United Kingdom is to optimise road use."

# THE TEAMS THAT DESIGN ROAD PROJECTS

The above-mentioned new approaches require new skills. Multi-disciplinary planning and design team must therefore be set up, which use the services of landscape planners, biologists, zoologists, doctors, urban planners, archaeologists or sociologists. They are not always directly associated in the project but are invited to participate according to requirements.

This enlargement of road project design team skills obviously has impacts on the core of the road engineer's activity, as his role is extended from the purely technical aspect to that of a team player."<sup>3</sup>, even if the non-technical aspects of road projects can be sub-contracted to private consultants, as they are in Japan, Belgium, Hungary, Romania, Switzerland or Slovakia.

Furthermore, in France, the increased recourse to legal proceedings has led to an ever greater need for the services of legal experts.

The project owner's thus now embraces planning and forecasting, socio-economic analyses, environmental sciences, the functional expression of needs, the formulation of the order, control of costs and lead times, control of sustainability, risk analysis, communication and consultation ... while project engineering entails networking, skills identification and guidance, skills pooling, teamwork, experience feedback and the transfer of competence, public/private partnerships and the complementarity between the State and Local Authorities.

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<sup>3</sup> c.f. Belgian report

# CONCLUSION

Sustainable development implies control of the processes of designing, building and operating roads for sustainable growth of transport systems. The control of these processes requires knowledge of the impact of a road and integration of the road into the overall planning of transport. The measuring of all these interactions involves multi-disciplinary teams with enlarged skills.

Innovation and technology must also be dedicated to sustainable development.

Road externalities must be taken into account, whether they are positive or negative, whether they are gains or costs. But although assessments have been made of the costs of road pollution, accidents and congestion, the road community has no efficient tools to assess the positive impacts of roads on human activities. Efforts must be continued to integrate sustainable development indicators into road project assessment tools, before and after the road has been opened.

The analysis of national reports shows the diversity of situations and needs from one country to another. In this context, it would be unreasonable to impose a single system of indicators to assess road projects. Projects must be assessed in the light of the demand to which they must respond.

Sustainable development is first and foremost responsive development, which opens up the way to economic and social development. In this framework, roads have a role to play that cannot be challenged.