



INTERNATIONAL ROAD FEDERATION
FEDERATION ROUTIERE INTERNATIONALE

IRF BULLETIN SPECIAL EDITION

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ENVIRONMENT

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Based in the midst of the pristine nature of the Tyrolean Alps, we are particularly sensitive to the importance of promoting and designing traffic management systems that are environmentally sound. It is a proven fact that smooth flowing traffic creates fewer emissions than stop-and-go traffic. That is why we like to keep traffic flowing and well guided with our state-of-the-art signalling equipment and traffic management systems — for the benefit of both the road users and our precious environment.

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The Link Between Road And Driver



02

◀ The Global Challenge

Recent reports from the UN Intergovernmental Panel on Climate Change (IPCC) and the UK 2006 task force led by Sir Nicholas Stern leave little doubt that human economic activities are contributing, in part, to climate change. The challenge for everyone is to mitigate and prevent their own contribution. For the road construction industry, the objective is to contribute to sustainable mobility - today and tomorrow.

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Construction, Congestion & Pollution

New construction techniques are already in place, offering less adverse environmental impact, the chance to recycle more materials and even greater economy. Are they being used? Congestion has many causes and threatens sustainable mobility. How does better planning and new technology ameliorate or prevent it and, with it, pollution? What of mega-cities?

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Towards Cohabitation & Solutions ▲

Roads enhance mobility. They also subtract from the useable space in an urban setting. So road systems should be shared, safely - between private vehicles, public transport, cyclists and pedestrians. Use of public transport depends on its attractiveness and price. Great events (such as the 2010 soccer world cup) can be "green" catalysts for positive change in rail/road networks. Finally, a round up of what road builders and users are doing and could be doing, to help the environment.

▲ CO2 Is Not The Whole Environment Story

The earth's atmosphere is shared by everyone. The most prevalent green house gas (GHG) is not the most potent one and there are alternatives to using petroleum in vehicles – the biggest source of CO2. Noise is also a big environmental issue, especially for those who are subjected to it. The road industry is proposing a number of means to decrease the noise level. Can scrapping road vehicles become a greener process?

IRF Photo Gallery 12

Photo gallery of the IRF Conference on 'Roads and the Environment', held from 5-6 February 2007, in Geneva, Switzerland.



Welcome to this first IRF Bulletin devoted entirely to a single topic - the environment. Whatever image that word conjures up, for road professionals it means one thing - the search for sustainable mobility. In that search, we must stress the things taken for granted - the positive social benefits of roads, access to services and individual mobility. We must make people aware of positive developments in the performance of vehicles and road infrastructure - better road surfaces using recycled materials, new tyre technologies, alternative fuels, Intelligent Transport Systems, new ways to share roads between private and public users.

If there is an over-riding need to reduce CO2 emissions - we as road infrastructure providers must deliver roads which minimise fuel consumption. A key issue is congestion, which increases emissions. For this, governments must develop sensible policies for managing the use of all transport networks during peak and non peak times.

It gave me great satisfaction to head the scientific committee which helped set up the "Roads & Environment" Conference, in Geneva. We now know that "sustainable mobility" is no empty phrase - whether one is looking at road safety, the school run, or at amphibians and deer trying to cross a road system. We had all the land transport actors together, for the first time ever in one room. Encouraged by this, we are setting up a working group which will hold a series of seminars to study all relevant topics in greater depth



Jean Beauverd
President and CEO, Colas Switzerland
Conference Chairman 'Roads and the Environment'



Photo: Sherrie Smith

Global warming is perhaps *the* subject of today's environment debate. When faced with the challenge of global warming, some people might think that the world can move seamlessly into an age of hydrogen or CNG-powered road vehicles, bio-fuels and wind farms, with carbon sinks to deal with any residual burning of fossil fuels. Others consider that only immediate and drastic changes to personal lifestyles will do: buying smaller cars or dispensing with personal cars altogether in favour of public transport, or taxis; certainly driving less aggressively and more evenly, if we drive at all; taking our own rucksacks to local shops rather than using plastic at supermarkets; spurning fruit or seafood that has been shipped halfway round the world.

If these are extreme positions, the path to future sustainable mobility lies somewhere between the two and contains elements of both. As a result, it is much more complex than either. This emerged strongly at the **IRF Roads & the Environment Conference** held in Geneva, February 5-6, on which much of this Bulletin is based.

There are human and natural drivers of climate change. The United Nations Intergovernmental Panel on Climate Change (IPCC) has provided direct observations of recent climate change. A longer paleo-climatic perspective comes from ice-core data. There is a universal need to understand and attribute climate change causes, and heed the projections of future climate change now being made. Just as climate knows no boundaries, so the effort to understand it, its rate of change and the degree to which mankind is affecting it, must be a global effort.

The IPCC had published its latest findings just before the Roads & the Environment conference confirming the data



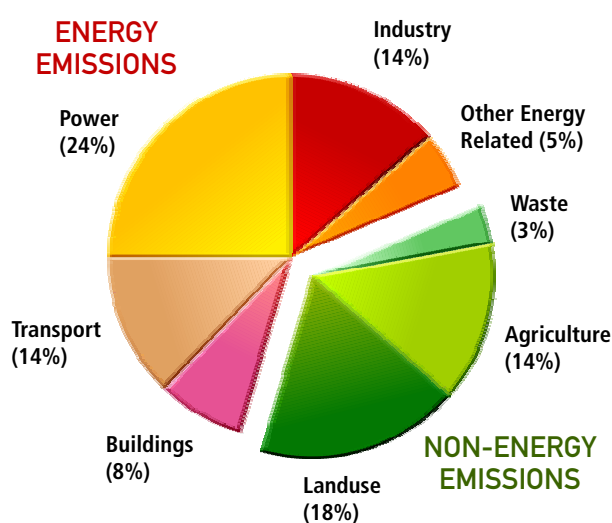
The Global Challenge

on which the 2006 Stern report in the UK was based. Simon Webb, one of the senior civil servants contributing to the conference, observed that representatives of 14% of the overall problem identified by Stern were in the conference room. But, just like representatives of those organisations and initiatives trying to mitigate the effects of man-made climate change. And those trying to mitigate were also to be found amongst those who produced emissions.

There is general agreement that "business as usual" is not an option. It is not sustainable. A do-nothing strategy would see an increase of at least 4° C in average temperatures by the end of the century. Half the world's big cities are beside the ocean and they would have to contend with a rise in average sea level of 4 metres. The economic costs of inaction would amount to 5-10% of world GDP. But if a reluctance to invest is factored in, the negative economic impact could amount to 20% of GDP. By contrast, the costs of mitigation would be only 1% of GDP.

Developing countries are potentially the hardest to be hit by man-made climate change. Those effects include more

volatile weather, desertification, lower crop yields, spread of disease, inundation of mega-delta regions and loss of bio-diversity. But adverse effects are also a strong potential for developed countries bordering the Mediterranean, for example. CO₂ emissions must fall, relative to 1990 levels, between 26% and 32% by 2020 and 60% by 2050.

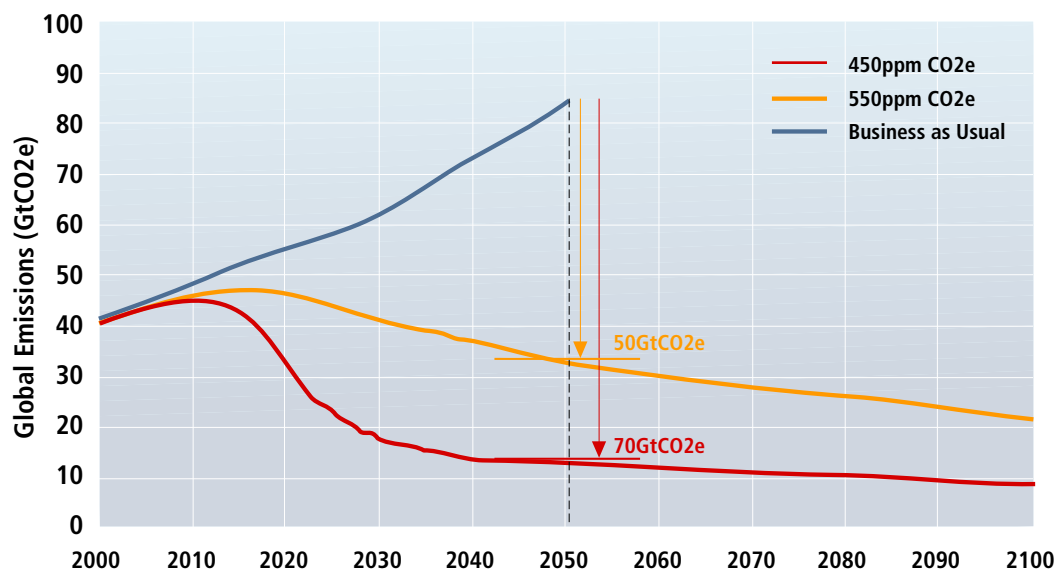


Total Emission in 2000: 42 GtCO₂e

Total Emissions
Source: Stern Review

For mitigation, we have policies and innovative technologies. Carbon pricing (and permit trading) has received a lot of attention. However, it has to be remembered that most of the cost of engine fuel to the user already consists of tax. Are governments applying any of that tax to mitigation measures, and are they taxing to encourage greener alternatives? Clearly public transport in greater measure must form part of the solution. Recently we heard that eco-driving could save 25% of fuel use with no other change to infrastructure or vehicle technology. Correct tyre pressures alone could save 10% of fuel used.

Approaches to the challenge and priorities for dealing with this differ by region and by activity. The EU is attempting to increase community cohesion by reducing regional disparities, by facilitating the movement of people and goods, by boosting productivity, competitiveness and growth, the opportunities for trade and more and better jobs. Financial support for regions is based on clear principles: the economic rate of return, social needs and environmental needs. The objective is to measure these



How Much Do Emissions Need to Fall?

Source: Stern Review

three on a common basis. The environmental assessment directive makes environmental impact a compulsory element for any operational project. The EU sees roads as having their role to play in *combination* with other modes. So far, the disbursement of transport money has included 48% to roads, 31% to rail, 6% to ports, just over 5% to urban schemes, and just over 1% to airports. But the EU wants to reverse this trend - and devote 75% to rail and about 20% to roads. The justification for this is not clear.

The scientist A.A. Gill makes an explicit challenge to those seeking to redress a perceived lack of sustainability in economic development: "People talk of getting back to, or recreating a balance in our development. But, was there ever a balance?" He implies that the natural environment had been forgiving for a long time - but we are close to a tipping point of irrevocable change. For the future, it is necessary to change our way of life, manage urban fragmentation, change the various desires for urban travel, cope with the fact that networks have become an integral part of our lives and gain capacity through operational management and balancing traffic flows - using "intelligent infrastructure".

However, if we are to change our way of life, are there principles to be observed? Environmental justice is a relatively novel concept to most people. It is evaluated through evidence to support regional and local transport planning. Priorities can be assessed in terms of measuring whether environmental impacts were fairly distributed. In these efforts, 110 Euros may be used as a typical "social" cost of carbon - a much higher figure than other carbon prices that emerged when listening to the experts.

Bound up with this concept were the effects of urban sprawl - with its productivity effects and social costs. Sprawl cities grow faster than planned cities and young industries favour the "edge" cities thus created. Apparently, if you "Google" the costs and benefits of this, you will find 39,500 references to costs but only 455 references to benefits. There is a correlation between high car use and the speed of city growth - and GHGs are higher in sprawl cities by 1-2% per year. Taking this into consideration, it might well be that a flat-dweller in Manhattan, without a car, may do more for the environment than someone *with* a car who wishes to live "close to nature."

But, to put the environmental impact of roads and road construction - and the challenges facing them - into context, one may look at the case of the Drax coal-fired power station in the UK. One 250 metres chimney emits 20.8 million tons of CO₂ every year, from burning 30,000 tons of coal per *day*. That is the same volume of CO₂ as emitted annually by 25% of all Britain's road vehicles, or a third of Britain's homes, or all of Ireland's heavy industry, or more than the emission of 103 of the world's 185 countries. That volume of CO₂ is produced in order to generate only 7% of Britain's electricity. Current amelioration plans might reduce emissions by only some 15%.

If the transport industry is seen as a moderately high contributor to total GHG emissions, its contribution remains small in comparison with some other sectors - principally power generation and land use; and power generation itself uses far too much coal - which is the fuel of yesterday.



Construction, Congestion & Pollution

In environmental terms, road construction is a very special case. This industry has a huge need for material and thus searches continually for cheap sources. Therefore, it has a good record of recycling. This goes back to the times when "recycling" didn't mean much to most of the people. The road construction industry nowadays uses waste such as glass and fibres, recycle aggregates, broken concrete, and fly-ash. And it still gets stuck with waste that nobody else wants. COLAS, as one company, saves the annual output of 24 quarries. It saves 11% of aggregates, 8% of hot-mix (equivalent to the output of one medium-sized refinery). The company now looks to replace oil-based material with agro-products, searching for complete substitutes for bitumen and fluxing oils. Today, it is even possible to derive road paint from oyster shells. By using cold and warm alternatives to traditional hot mix, the construction company can make large maintenance savings.

Therefore, why is recycling applied to road construction and maintenance so difficult in some countries? Why is toluene still used in paints? Why are heavy metals still used? Why is coal tar always specified in some countries? It is not a matter of price. Is it fear of innovation, of having to bear responsibility for something that is new? In many places, old habits truly *do* die hard.

Another excellent example is Caterpillar, who has made equipment and engines for road construction for 80 years. It has 90,000 employees worldwide and is now facing future challenges by placing all products and services (infrastructure, energy, material and mobility) in a sustainable development framework. The strategy is to create a new corporate culture and operate as a business while pursuing reductions in emissions and waste, and enhancing value to the customer. Therefore, the company has introduced bio-fuels in engines. It is using GPS to double operator productivity. Caterpillar also follows the US Climate Action Partnership principles, which urges Congress to bring about Kyoto-type emissions reductions. This policy framework has given a greater potential for success to local public/private partnership initiatives.

With climate change, come further challenges - for example, how to cope with water run-off from roads when peak rainfall increases by 30% and river flows by 10%. These factors increase the chances of mudslides/landslides. Run-off itself can contain hydrocarbons, metals, chlorides, pesticides and herbicides, spillages and sediment. Even sediment is a pollutant, as are all the others.

Roads have high drainage variability. Mitigation measures are aimed at treatments of various pollutants and attenuation. Porous surfaces such as asphalt absorb materials and release them more slowly than would otherwise occur. Sediment control is a number one issue, followed by oils and cementations material.



Photo: Marinela Sotoncic



Transport planners have always struggled with reconciling transport speeds, emissions, energy and engines. Intelligent transport systems - ITS - are policy tools to capture benefits and increase efficiency. They monitor and process actions to be taken, in real time, by comparing local, regional and international movements - and identify utilization, capacities and results. They provide public transport education and information. Most importantly they enable control, release and delegation of traffic, to increase acceleration. Information gained forms the basis for congestion charging, where applied, but also for a fluency to avoid stop-and-go traffic, which is emissions intensive.

The big idea is to foster clean and efficient mobility. Key technologies have been identified as prime instruments for this. They can optimise according to a set of criteria (e.g. speed, pollution levels). Today, systems are automatic and vehicles are used for mobile data collection. A tachometer is replaced with e.g. fuel consumption and range data, providing an incentive for eco-driving. In addition to saving a potential 25 billion tons of fuel and 50 billion tons of CO₂ a year, eco-driving has a clear safety aspect.

This is all very nice, but what are the present and future challenges posed for planners by mega cities - those in excess of 10 million people? Mega-cities bring enormous structural pressures. In effect, they tend to be islands of wealth in oceans of poverty as they contribute to social exclusion. There is a tendency for "green wash" from the public agencies in the debate on options for change and renewal. In mega-cities, congestion has huge effects on everyday life, but also on evacuations at time of disaster. Strange and often unpredictable congestion conditions build up in polycentric mega-cities. Yet, the building still goes on. For example, in 1993, the "last urban freeway in California" was announced. Currently, there are 23 freeway mega-projects (that is, developments of more



5 Golden Rules of "Eco-Driving"

Shift up as soon as possible

Maintain a steady speed

Anticipate traffic flow

Decelerate smoothly

Check tyre pressure often

than a billion USD) due to come on stream between now and 2014. There is a US planning and policy discussion going on over what/whether/how, in relation to road construction.

Mega-projects tend to counter the notion of sustainability. They tend to subvert the possibility of environmental protection. The challenge is "not just to put lipstick on the gorilla", but to address the problem of pollution in an efficient and effective manner.

Smaller scale cities offer perhaps more sustainable traffic solutions. The system used in Patras, Greece, to reduce congestion and improve travel time reliability offers a case in point. The scheme produces more efficiency. Commuters make informed choices of routes and modes; there are savings on fuel use and emissions; *existing* transport capacity is used in better ways. It is proof that traffic management in a smaller city can be very sustainable and successful. One must perhaps ask the question: Are mega-city transport systems ever sustainable?

Modern road transport systems reflect the increasing ingenuity of road builders, scientists and city planners in their attempts to improve the lived environment. Building roads is no longer just a matter of "predict and provide" using old methods. It is a complex process involving everyone.



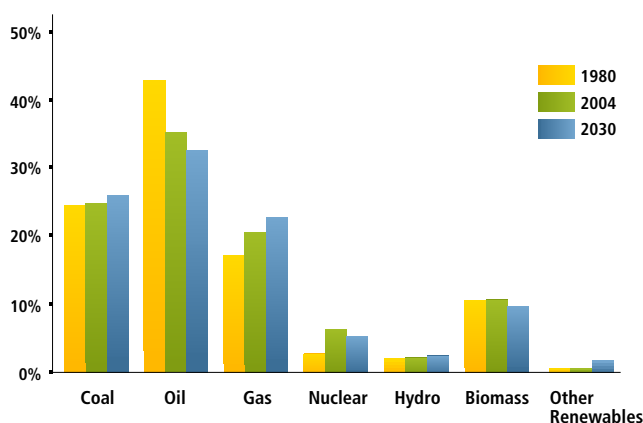
CO₂ is Not The Whole Environment Story

The most prevalent green house gas (GHG) is not the most potent one. Unburnt methane and nitrous oxides from, among other things, agriculture, act as GHGs to orders of magnitude far greater than CO₂. At the same time, there are serious alternatives to using petroleum in road vehicles.

According to Challenge Bibendum, organised by Michelin, the technical advances to provide emissions mitigation solutions are there, but we need joint action. The Bibendum is looking at hybrids, at electric fleets for public service vehicles, at safety systems, at enhanced communications and ITS. Lithium batteries have now broken through the 200 km range barrier and become more attractive. On the other hand, fuel cells are currently not yet offering great advances and they have less than 1% of the market. Bio-fuels and lower carbon-rich fuels are already mitigating CO₂ growth, but we have not yet reached the stage where reduced emissions per vehicle-kilometre are compensating for the growth in total vehicle-kilometres. In this, vehicle weight is still a problem.

"There is no silver bullet to solve all problems with one shot. There are several bullets and we must fire them all." An example of one such significant bullet is the target in China that 50% of vehicles should be hybrid or electric, by 2050. A "silver bullet" - at the *global* level - is carbon capture and storage (CCS), whereby CO₂ could be pumped out of power stations or large industrial plants and, via pipelines, into empty oil and gas fields. A new EU rule aims at ensuring that all new fossil-fuel plants are fitted with CCS mechanisms by 2020. But at the global level, the debate will soon centre on India, China and the US - all of whom are opening new coal-fired plant at a rapid rate.

At the end of the day, *realism* over future fuel use is required. For example, with the introduction of bio-fuels in the UK as a result of EU legislation, there is a target to have 2.5-5% bio-fuels in petrol and diesel. GHG emissions from doing this will depend on the crop used, the production process and by-products. Second generation bio-fuels will use alternative crops: cereals, sugar beet, butane, plus wood and ethanol. Ethanol can be converted to a petrol equivalent, and vegetable oil methyl ester into diesel.



Share of Fuel in Primary Energy

Source: OECD/IEA

One must remember that fossil oil will continue to be part of the picture for a long time. There are still some 3 trillion barrels of oil recoverable and we have used about 1 trillion. **In proven reserves at the moment, we have only 40 years' consumption left - not very much.** Other sources will include EU coal, gas and other fuels. The OECD/IEA currently expects that more than 25% of primary energy needs will still be provided by coal in 2030. This is a lower share than that forecast for oil, but much higher than the share of gas.



What about hydrogen as a future fuel? The use of hydrogen in European transport goes back 75 years to the days of airships. However, as a motive fuel it is competing with a 100 years of petroleum. The European Hydrogen Association's mission is to foster development of hydrogen technologies in concrete usage in industrial, commercial and consumer applications. The Hydrogen Fuel Project was established to develop a research and deployment strategy to achieve a 2050 sustainable hydrogen infrastructure. A Euro 6.4 billion investment is being made by 2012. This has been committed by industry in general. One example is on the UK Isle of Wight, where a wind electrolyser will use excess wind-power to produce H₂. A possible alternative source is solar panels. In terms of use in vehicles, H₂ is available on garage forecourts in Milan and also Frankfurt.



It is possible to view coal as the fuel of the 19th century, oil as the fuel of the 20th, and gas as the fuel of the 21st. CNG (compressed natural gas, essentially, methane) is the preferred fuel in commercial vehicles in several large Asian States: Pakistan, India, and China. In Pakistan, 50% of cars there already use CNG, since the government ordered conversion of certain vehicle types. Widespread use of CNG is an example of what can be achieved when a desire for less specific fuel source dependency, an existing fleet that is largely diesel, a desire for pollution control and pipeline availability, all coincide. However, CNG filling stations are very unevenly distributed around the world - mainly as a result of comparative economics, which in turn largely reflects government attitudes to various fuel types. Argentina has 2'600 stations, Brazil 1'700, Pakistan 1'500, Europe as a whole only 1'400, Canada 800 and the US, a mere 200.

Green House Gas emissions are far from being the only environmental issue. In fact, noise is also a factor and one which the road industry has addressed for several years. Noise, especially for those subject to it, is a very difficult pollutant. There are a number of ways in which the road construction industry has addressed this issue and continues to remove it.

For example, asphalt/rubber pavements in the US are *the* quiet and durable solution to road noise. Noise absorbing

pavements have been studied for more than 30 years, since noise levels became such a hot local political issue. It should be remembered, that only a 10 dB increase in measured noise represents a doubling of perceived noise. One has to differentiate tyre, aerodynamic and engine noise. Noise from the tyre/road interface can be up to 70% of noise perceived and the best policy is to eliminate it *at source*, rather than building expensive, obtrusive, noise shields.

Rubber has long been used as a shock absorber, to reduce vibration. Tyre noise - any noise - arises from vibration. It is a neat squaring of the circle to use tyres in suppressing tyre noise. The US alone generates about 300 million waste tyres every year. Typically, in a 50 mm. rubber/asphalt overlay, 1'260 waste tyres can be used, therefore recycled, for one kilometre of road. The use of this technique is also associated with a 50% reduction in wet-weather accidents. Thus, lives are saved and injuries reduced, which is a very positive additional result. And there are even other trade-offs to be made - in tread pattern, tread material, tyre internal structure *and cost* - in reducing noise through design of the tyre itself.

One can go further, using waste tyres. It's possible to make almost the complete road from them. For example, using the "Starr Tire Pile" in Pennsylvania (with 17 million waste tyres) and adjacent sand quarries, it was possible to make "paved" roads to a high standard, at USD 3 million a mile, compared to the USD 310 million of a local road, and the USD 1'200 million of interstate. The local economies can benefit from this: A waste material is used, accident risks are reduced, and pollution through run-off is reduced. The question must be asked - why is this technique not used more widely?

If old vehicle tyres find new life in road applications, what of the rest of the vehicle at the end of its life? A UK objective has been to implement and even improve on, the EU End of Vehicle Life Directive. From the start of 2007, every vehicle must be taken back free even if it has no residual value as a vehicle. However, there is built-in value in the implementation of the EU Directive: 75% of the population can dispose of a vehicle within 16 km; no owner has to travel more than 50 km; certain components *must* become recyclable and sustainable. As a result, the total metallic recovery is at 75%, with an eventual total recycling objective of 95%.

In all of this, we can see that promising alternatives to petroleum are gaining ground, but that much remains to be done. At the same time, road builders and road transport providers have a strong record of recycling waste materials. This has a triple virtue: pollution is prevented because waste such as rubber is not burned; no fuel is used because there is no burning; and demand for traditional and expensive raw materials is reduced. Nearly *all* materials in old vehicles will soon find new uses.



Towards Cohabitation and Solutions

Here, the Stern report is crucial. Transport represents 14% of energy consumed (but that does not include electricity used in public transport). Transport represents the fastest growing source of GHG emission in OECD countries and the second highest in non OECD countries. But we still lack a methodology to answer questions such as: "Do we finance a ring-road, or a metro-system"?

And, there is an ethical challenge in relation to less-developed countries. How do we reconcile the Millennium



The Road is a space of cohabitation and sharing. The road is used by cars, trucks, public transport, bicycles and motorcycles, pedestrians and in many countries by donkey carts and other animal-drawn vehicles.

It is acknowledged, that roads enhance mobility, taking people out of isolation and therefore poverty. In Africa, 70% of road kilometres are made on foot. Remedying this, one must take into consideration the protection of the social and physical environment and provide sustainable development.

There are World Bank policies aimed *only* at projects that demonstrate a good governance process, sound environmental strategic assessment and design, minimal adverse environmental effects, minimal harmful consequences on people, good policies on fisheries and wildlife and clean air initiatives. In other words, cohabitation in its widest sense.

The World Bank is a coordinator and facilitator. With lending power behind it, it is a natural partner of the IRF. There is a constant search for best practices, seeking a way of balancing the positives and negatives. With an investment of USD 30 billion over 10 years promising good, sustainable returns on conventional measures, the "externalities" have still to be measured.

Development Goal of halving world poverty by 2015 with making the reductions in CO2 emissions demanded by the Stern report?

The road construction industry and local government is also paying more and more attention to the preservation of local ecosystems. There is one important balance to be struck, an element of sustainability: that between road network extensions and preservation of nature. Roads can be barriers to wildlife, but also conduits for it. Routes for creatures ranging in size from frogs to deer can be built into, under, around and above network developments. This is vital, when 10 hectares *a day* are currently taken up by road development in the EU alone. There is a general tendency to concentrate on human populations when looking at road fatalities. In Switzerland, for example, casualties include 3 million amphibians, 2 million birds, 18% of the badger population and 9% of the hedgehog population, a year. These figures matter, in terms of biodiversity.

In Scandinavia and North America, the phenomenon is also significant in terms of collisions between vehicles and large deer, with loss of human life. All this largely results from the nature of roads as barriers, which can cause fragmentation of wildlife populations, to the point where local populations are no longer sustainable. "Nature routes" across and around roads should always be considered at the earliest possible planning stage of road



development. They work and they help preserve the local ecosystems, which is equally as important as local economic development.

Mobility is vital in all fields. The totality of the transport-related sectors, including vehicles and roads, accounts for 20% of world GDP. Transport is the only general sector in which CO₂ emissions are currently forecast to rise steadily. This is in stark contrast to the 95% per-unit reduction in CO, HC and NO_x output since the 1970s. The world's vehicle fleet has 1 billion units and 70 million cars are added to it every year.

This leads us to the conclusion, that mobility must be safe, secure, energy efficient and environmentally sustainable. The best ways to do that are to make better use of existing infrastructure and connectivity, improve inter-modal connectivity and use intelligent transport systems. At a local level, there has to be an improvement in the capacity and quality of roads.

Economic liberalisation and better transport has resulted in 6% p.a. world economic growth over the past 50 years. A cup of coffee uses 29 different transport related activities; a vehicle itself requires hundreds. "Everything in this room has been on a truck," was pointed out at the recently organised IRF conference on 'Roads and the Environment'. However, sustainable development is a wider concept than "the environment". It encompasses economic growth and social development. Use of incentives will provide adequate infrastructure and will support sustainable development and good governance, helping people in their daily lives. Congestion and pollution are the penalties for not getting infrastructure development right!



Bus-only-lane in Shanghai

Source:

Mobility patterns are becoming more complex, as general mobility increases. At the same time the quality of the urban environment, generally, is decreasing. Most cities have a common set of problems: air quality, increased CO₂, noise and traffic congestion. Some 300,000 die prematurely each year, because of poor air quality caused primarily through high levels of traffic in urban streets. In cities, people and traffic share a limited commodity - space. In the case of Paris, 70% of that space is devoted to traffic and 30% to pedestrians. Of the 70%, some 60% consists of parked cars. Thus, of the total public space in Paris, 42% is taken by parked cars! Very clearly, this is a political matter. Cities need urban planning to combat the phenomenon, with a perspective of 10-20 years.

Positive measures would consist of high quality alternatives to the private car such as the re-introduced light rail system in Strasbourg, or bus corridors in Dublin, or the dedicated CNG-fuelled bus line in Nantes, or bicycle stations at main railway stations. Constraining measures would consist of limiting private car use within cities, such as congestion charges in London or the severe parking limits in Geneva. For solutions to be found, there always has to be an element of "carrot and stick," of positive incentives and penalties.

An attractive public transport offer can be a highly potent part of sustainability. In Porto Alegre, Brazil - a city of 3 million people - there are 880 km of public transport systems, of which 50 km are in dedicated lanes. As a result, 67% of urban travellers take the bus. There has been a continuity of urban transport planning for 40 years, despite frequent political changes in the country and city.

Traffic mitigation, easing of congestion, minimum emissions and the need for the human dimension in future development - are all currently encapsulated by a highly successful multi-modal transport scheme in the Republic of South Africa, resulting from the need to enhance public transport links for the 2010 soccer world cup. At the moment, South Africa is characterised by an over-reliance on private transport, a 40% true unemployment rate - but by the ownership of 24 million mobile 'phones. The multi-modal transport scheme placed heavy reliance on the ISO 14001 environment standard. For example, as part of the environmental management plan, every tree dug up en-route was relocated to Soweto. The population was very involved in this and often stood by, to make sure this was done. Sangomas - traditional healers - did search and rescue operations for their necessary plants, along the project routes. These plants were then matured in nurseries and replanted in the wild.

Such examples show that coherence in urban planning and environmental protection can lead to interesting offers for the consumer, even outside Europe.



Carbon offsets

The Stern report makes clear that carbon trading/carbon offsets have an important potential for limiting GHG emissions. According to specialists, the road transport industry *could* become carbon neutral, very quickly - through joint reforestation of an area the size of Dorset (UK) every year. This is of course not feasible - even though the loss of forests contributes more to global warming, every year, than the whole transport industry. On a more practical level, it is a matter of engaging and integrating the corporate sector, of providing a catalyst for partnerships. The possibility to offset has now been more formalised in all industrial fields. The carbon "offset industry" will actually grow from USD 60 billion in 2004 to about USD 450 billion by 2009. There are a number of initiatives that can be taken and we must apply multiple approaches to reduce emissions.

At the end of April 2007 the Norwegian government announced that Norway, as a country, aimed to become carbon neutral by 2050. It would be the first country in the world to become so. Norwegian emissions of GHGs are currently 11 tons per capita - three times the world average. So Norway plans to use its USD 300 billion of reserves built up from oil and gas exports to buy carbon credits. It would become carbon neutral through carbon trading.

The effectiveness of carbon trading will be defined by the "proper" price for a tonne of carbon, as with any other product. That is, a price determined by supply and demand without artificial market distortions. The only large-scale supra-national carbon-trading plan at the moment is that of the EU. Phase II of the EU plan starts in 2008. Phase I of the plan was ruined by individual European governments issuing too many permits. The price of carbon at one point fell to Euro 1.3 per ton. The initial price in 2008 may be around Euro 18 per ton - a level that few people would regard as sufficiently high.

In the debate at the IRF Conference on 'Roads and the Environment', Barry Gilbert-Miguët (Borneo Tropical Rain Forest Foundation) said that so often, the wrong people are making money out of carbon trading. Maryvonne Plessis-Fraissard (World Bank) emphasized that *global* agreements on carbon trading and prices were needed. George Weyerhaeuser (World Business Council for Sustainable Development) stressed the need for *sectoral* markets and prices first, because we can't wait for governments. Carbon permits would then be traded *only* within those sectors.

Conclusion

As a conclusion, we acknowledge that there is a clear correlation between mobility and economic growth. At



Barry Gilbert-Miguët
(Borneo Tropical Rainforest Foundation)

the same time, we all recognise that today's system of mobility is not sustainable. In doing something about it we have to reach for several goals: reduce the NOx type emissions and health problems, limit GHGs to sustainable levels, reduce transport noise overall, reduce deaths and injuries, mitigate congestion and narrow the mobility divide. But we should not be sanguine about future fuel use. Between 2004-2030, fossil fuel will represent 83% of the total increase in energy consumed, on current growth patterns. Transport will be at the top of the growth tree. In the current political environment it is difficult to sustain a "top down" approach, involving governments alone. So a lot of work must be done at the *sectoral* level, across countries.

The IRF international conference on 'Roads and the Environment' showed that, for the industries supporting personal and commercial mobility, there is no *one* silver bullet. It showed that efforts to make mobility sustainable - through initiatives like eco-driving, alternative fuels, recycling, planning for a better lived environment within urban areas, cohabitation of various road users and transport modes and increased road safety - are real and offer great future promise.



"Roads and The Environment" Conference

Photo gallery of the IRF Conference on 'Roads and the Environment', held from 5-6 February 2007, in Geneva, Switzerland.



Speakers at the IRF Conference 'Roads and the Environment'

5-6 February 2007
Geneva, Switzerland

Welcome

Jean Beauverd, Conference Chairman, Director General, Colas Switzerland

Sibylle Rupprecht, Acting Director General, International Road Federation

Key Note Speeches

Maryvonne Plessis-Fraissard, Senior Advisor, Sustainable Development Network, The World Bank

José Capel Ferrer, Director Transport Division, UN Economic Commission for Europe (UNECE), Geneva

Jens Hügel, Head - Sustainable Development, International Road Transport Union

Barry Gilbert-Miguet, Director General, Borneo Tropical Rain Forest Foundation, Geneva

Martin Vinzens, Deputy Head of Urban and Rural Development, Federal Office for Spatial Development (ARE)

George Weyerhaeuser, Sustainable Mobility, World Business Council for Sustainable Development

Reconciling Network Planning with The Human and Natural Habitat

"Contribution of the EU Regional Policy to transport investments: Socio-economic needs and environmental impacts" - **Pierre Godin, Belgium**, EUROPEAN COMMISSION, DG REGIO/C1 - Développement thématique et Impact

"Getting back to Balance" - **Anders H.H. Jansson, Finland**, PIARC (Finland), Chair, Sustainable Development and Road Transport

"Interurban: Balance Between Network Extension and Preservation of Nature" **Marguerite Trocmé, Switzerland**, Project Manager, Swiss agency for the environment, forest and landscape

"Socio - Economic versus Environmental Impacts of Motorway Construction" - **Chris Fry, UK**, Head of Centre for Sustainability (C4S), TRL Limited

"Urban Sprawl: Productivity Effects and Social Costs" - **Andreas Kopp, France**, Chief Economist ECMT and OECD/ECMT Transport Research Center

Road Construction and Environment

"Environmentally Friendly Construction Technology" - **Henri Molleron, France**, Director Environment, Colas (France)

"Sustainable Development at Caterpillar" - **Robert Thiel, Switzerland**, International Customer Services Department - Caterpillar EAME Marketing

"Water Cycle - In Construction Phase and Design of Treatment Systems for Roads" - **Bob Sargent, UK**, Technical director, Hyder Consultant, UK

Round Table Discussion: 'Mobilité individuelle - quel avenir pour l'environnement'

Modérateur : Philippe Lugassy - Télévision Suisse Romande

Monsieur le Conseiller d'État Robert Cramer, Département du Territoire (DT), Genève

Monsieur Rudolf Dieterle, Directeur, Office fédéral des routes (OFROU)

Monsieur Claude Haldi, Président, Automobile Club, Section Vaud

Professor Martin Beniston, Titulaire de la Chaire de Climatologie, Université de Genève

Congestion and Pollution

"Traffic management and ITS" - **Richard Harris, UK**, Director Intelligent Transport Systems, Faber Maunsell - AECOM

"ICT for Clean & Efficient Mobility"- **Paul Kompfner, Belgium**, Head, Efficiency & Environment, ERTICO - ITS Europe

"Urban Scenario; Scarce Road Space: Mega Cities, Mega Issues" - **Lisa Schweitzer, USA**, Assistant Professor, Urban Affairs and Planning, Research Fellow, Center for the Study of Sustainable Mobility Urban Affairs and Planning University, School of Public and International Affairs, Virginia, (USA)

"A System to Reduce Congestion and Improve Travel Time Reliability - Application in Patras, Greece" - **Prof. E. Matsoukis, Greece**, Univ. of Patras, Greece, Chairman of the Greek Road Federation

Road Users and Environment

"Stern Report" - **Simon Webb**, UK Director General, UK Department for Transport

"What technological advancements allow to anticipate the impact of user mobility on the environment"- **Patrick Oliva, France**, Director Challenge Bibendum, Michelin

"Issues faced by the Introduction of Biofuel in the UK" - **Malcolm Watson, UK**, Technical Director, UK Petroleum Industry Association

"Hydrogen and Fuel Cell" - **Marieke Reijalt, Belgium**, Executive Director, European Hydrogen Association

"CNG - The Alternative Fuel for Commercial Vehicles" - **Khayam Husain, Pakistan**, Managing Director, Automobile Corporation of Pakistan

Noise and End of Life

Chairman: Patrick Lepercq, Michelin France

"Noise Absorbing Pavements (Drain Concrete / Asphalt)" - **Cecilia Mancero, USA**, Vice President/International Sales, The STRATCO GLOBAL Companies

"Role of The Tyre in Noise" - **Laura Playa-Pariente, France**, NVH (Noise Vibration Harshness) Performance Analysis

"Where The Rubber Makes The Road" - **Kevin Abbey, USA**, Director, Center for Dirt and Gravel Road Studies.

"Implications of EU Directive of End of Live Directive for Vehicles" - **Martin Lamb, UK**, Regional Manager, Wales, TRL Limited, Wales Office

The Road - Place of Cohabitation

"Public Transport - Future of Mobility"- **Brigitte Ollier, Belgium**, Director of the UITP-EuroTeam, The International Association of Public Transport (UITP)

"Impact of An Attractive Public Transport Offer" - **Luiz Senna, Brazil**, Minister of Mobility, Porto Alegre (Brazil 4th metropolis), Empresa Pública de Transporte e Circulação - EPTC, Brazil

"New World Economy" (NWE) Focus and Look at "Green" Issues and Its Impact on public Transport Preparations for SWC 2010 from a NWE Perspective - **Dr. Paul Vorster, South Africa**, CEO, ITS South Africa (SASITS - SA Society for Intelligent Transport Systems)

Discussion and Conference Conclusions

Jean Beauverd, Conference Chairman, Director General, Colas Switzerland

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