DEDICATED TO MAKING A DIFFERENCE

The Sustainable Mobility Project

July 2002 Progress Report

World Business Council for
Sustainable Development

SUSTAINABLE MOBILITY

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Introduction

Launched in April 2000, the Sustainable Mobility Project has already produced an insightful, arm's-length analysis Mobility 2001, which describes clearly the challenges facing the world's current systems of transportation. The report is available at the project's website www.SustainableMobility.org

We have now launched the main phase of the project. Representatives of twelve major global companies, members of the World Business Council for Sustainable Development (WBCSD), comprising the project's core leadership, have developed ten work streams, each of which is essential in building an effective and meaningful response to the challenges posed in Mobility 2001. An action team, consisting of member companies but also including, for several work streams, non-member organizations and institutions, will manage each of the work streams. This participation of external partners is essential to ensure the quality of the project's deliverables and a perspective encompassing all major modes of transportation and all regions of the world.

Indicators of sustainable mobility, selected by the project after extensive consultations, will guide the action teams and also be used to monitor team progress. Work streams will address the supply and demand aspects of personal and freight mobility, including infrastructure issues. They will consider social, economic and political institutional capabilities, which Mobility 2001 considers the "overarching" challenge to achieving sustainable mobility. When these tasks are accomplished, the project will focus on mobility in both its urban and also its long-distance contexts, in developed and developing countries.

Because one of the main purposes of the project is to develop our visions of sustainable systems of mobility in 2030, we have dedicated one work stream to this complex task. We will start with a straw-man vision, but we fully expect it to change as it is informed by the findings of the other work streams over the next 18 months. Scenarios will be a feature of this work stream, as will a series of mobility workshops involving a range of partners and stakeholders from developing and developed countries.

The integrity of the project and the quality of its work product are the special focus of an Assurance Group, selected by and reporting directly to the WBCSD. The men and women of this group, representing different regions of the world, are distinguished transportation and mobility experts. The Assurance Group has already made several key recommendations that the project has adopted.

The project hopes to create a platform for new and improved cooperation among companies involved in mobility and to outline plans for continued dialogue with stakeholder groups. There is a growing understanding that business, governments and NGOs need to join forces in creative ways if we are to address effectively the challenges to mobility. We want to encourage new partnerships, built on commitment to common goals.

To be real advocates for sustainable mobility, our companies must translate our words into actions. At this point in the project, we do not yet know the full extent of what that may require of us. However, as part of the project deliverables, we intend to prescribe the steps required, over a realistic timeframe, to achieve sustainable mobility.

The project will deliver, in December 2003, its visions of sustainable mobility, looking forward to 2030, along with a set of pathways for getting there. Although 2030 may seem distant, in terms of transportation planning and execution, 28 years is a relatively short period of time. If we are to make real progress by 2030, measures that will eventually produce the necessary changes must be undertaken soon. We expect this project to play a decisive role in moving our companies forward and in helping to motivate other industries, institutions and organizations to undertake similar efforts to help define and achieve sustainable mobility.

Thomas A. Gottschalk

Executive Vice President
General Motors Corporation

Dr Shoichiro Toyoda

Honorary Chairman
Toyota Motor Corporation

Philip Watts

Chairman of the Committee of Managing Directors
Royal Dutch/Shell Group of Companies

I. The Sustainable Mobility Project – its characteristics

DEFINITION

Sustainable Mobility is the ability to meet society's need to move freely, gain access, communicate, trade and establish relationships without sacrificing other essential human or ecological values, today or in the future.

BACKGROUND

The Sustainable Mobility Project, launched in April 2000, is motivated by the dilemma facing future mobility: on the one hand, mobility is essential to modern civilization and human needs; mobility systems are facilitators of economic activities and human relations. Mobility literally makes modern economies possible. On the other hand, there is a growing understanding that the world's continuing and growing demand for mobility cannot be met simply by expanding today's means of transportation.

The project intends to point the way to mobility systems which are more efficient, more equitable, and less environmentally and socially disruptive, while preserving the benefits that these mobility systems provide.

Improved mobility of persons and goods has been a fundamental precondition to the standard of living now enjoyed by the vast majority of individuals living in the developed world. Improving mobility opportunities is likewise a precondition to enabling those living in the developing world to attain a similar standard of living.

Past improvement in mobility have been purchased at a large cost to society. Projections of the social and environmental costs of achieving the mobility opportunities sought by those not now enjoying them indicate that they will dwarf those incurred to date. It is unlikey that present levels of mobility in the developed world and the desired levels sought by the developing world are possible under a "business as usual" mindset.

In short, the world's present mobility trajectory is unsustainable.

OBJECTIVE AND SCOPE

Under the auspices of the World Business Council for Sustainable Development (WBCSD) in Geneva, the members of the Sustainable Mobility Project have joined together to identify how to address this dilemma. These members are all companies whose long-term survival depends on doing so. However, they also realize that they cannot make mobility sustainable by themselves. The task requires more talent and resources than any one of them – or, indeed, the entire group – can muster.

The objective of the project is to establish a vision of sustainable mobility in 2030 and various pathways for getting there.

The project covers all aspects of sustainability (social, environmental and economic); all modes of mobility (air, sea, and land transportation); and all regions of the world, developing and developed countries alike. It takes a global perspective, because the challenges are global, and solutions will depend on cooperation among governments, business, consumers and other elements of civil society.

> "If we are to avoid a continuing descent towards unsustainable gridlock and environmental degredation then the way we move ourselves about is going to have to change. We believe that our own commercial future depends on our ability to adapt and meet these challenges"
>
> Mr. Philip Watts,
> *Chairman of Shell's Committee of Managing Directors*

MEMBERS

The twelve core-group companies of the project are: BP, DaimlerChrysler, Ford, General Motors, Honda, Nissan, Michelin, Norsk Hydro, Renault, Shell, Toyota and Volkswagen.

The WBCSD Sustainable Mobility Project is unique in a number of ways:

First, the project is unique in its membership. Many of the toughest issues facing the world in making mobility sustainable require the actions of multiple industries – as well as actions by governments and the public. The combination of motor vehicle manufacturers, energy companies, and materials and component suppliers brings a unique breadth of experience and range of capabilities to the search for sustainable mobility.

Second, the project is unique in its scope. It aims at nothing less than producing a vision for achieving

sustainable mobility that would incorporate all modes of transport, the transport of goods as well as persons, and transport in the developing as well as in the developed world. Such a scope is necessary if the range of issues required to make mobility sustainable are to be understood.

Third, the project is unique in its process. It is making an extraordinary effort to reach out to an extremely wide range of stakeholders, both to assure that the perspective of its sponsors is sufficiently broad and to communicate its message.

OUTREACH

Although major auto and energy companies are taking the lead, the project is not about determining individual technical or commercial responses. It is about developing sound policies, partnerships and options for change. Thus a crucial part of the project is to engage stakeholders, from all parts of society and all regions of the world, to solicit their opinions, to understand how they see the current state of mobility and to hear their proposed approaches and recommended solutions. The complexity of achieving Sustainable Mobility reaches far beyond the capabilities and leverage of any single entity, public or private. Without collaborative and creative interaction within the international community, sustainable mobility is likely to remain out of reach.

THREE PHASES

The project has been organized into three phases:

- **Phase 1:** An analysis of current patterns of mobility and their sustainability. This phase culminated in the Mobility 2001 report – a snapshot of world mobility at the turn of the century, published in October 2001.
- **Phase 2:** A scoping study to determine the framework and processes for development of the project's main report. This phase ended with the adoption of goals and establishment of action teams with specific assignments to respond to the "grand challenges" posed in Mobility 2001.
- **Phase 3:** The main phase of the project will culminate in a final report, Sustainable Mobility 2030, scheduled for completion by December 2003.

The WBCSD Sustainable Mobility Project is only about mid-way through its scheduled lifetime. However, it already has rung up a number of important accomplishments:

First, it has assembled a group of firms that, though competitors, must cooperate in unique ways if mobility is to become sustainable. It has helped these competitors to move beyond their parochial concerns and develop a shared understanding of what sustainable mobility means and what it may require to achieve it.

Second, it has sponsored a report, Mobility 2001, which is both comprehensive and understandable to the layperson. Many reports addressing sustainable mobility are aimed at presenting the narrow views of their sponsors. Mobility 2001 explores mobility-related challenges that go well beyond the business interests of the group of firms that sponsored it. Other reports are addressed primarily to members of the technical community. Mobility 2001 is addressed to the public at large. It explains in clear ways the challenges facing mobility.

Third, it has developed a broad plan of work, based upon the findings of Mobility 2001, to produce a vision of how mobility can be made sustainable

and describing various possible pathways for doing so. This will result in a road map to the future both for the sponsoring companies and for the other stakeholders that must be part of any effort to make mobility sustainable.

The aim of Phase 3 of the Sustainable Mobility Project is to paint a picture of the challenges and the opportunities involved in making mobility sustainable by the middle third of this century. The project intends to cast its analytical net as widely as its time and resources permit. Nevertheless, we fully expect that some parts of this picture will be more completely filled in than others. Considering the background and experience of the sponsors, we will not be surprised if these are the parts most closely associated with the road vehicle. But this should not be taken as a sign that the project's scope is excessively narrow. As both its supporters and its critics are quick to observe, the road vehicle is at the heart of so many of mobility's difficult choices that mobility cannot be made sustainable without addressing the role that it can and should play going forward. Similarly, the actions that other industries must take to make their parts of the mobility picture sustainable cannot be determined without an appreciation of the possible future role of the road vehicle. While the road vehicle might not be as dominant in transporting people and goods in the future as it is today, it will undoubtedly continue to be one of the most important parts of the overall mobility picture.

This project will not provide a complete answer to the immense challenge of making mobility sustainable. But it will provide a good start, both for its sponsors and for others having a stake in the outcome, whether they are other industries, governments, or the public at large.

"Sustainable Mobility is the only viable strategy to tie the corners of the World together, and technology is the rope, but without people putting their creative minds together across all sectors of society, we will never be able to tie the knot"

Dr. Shoichiro Toyoda,
Honary Chairman, Member of the Board, Toyota

FIVE PROJECT GOALS

Substance Goals:

- *Develop visions of future global systems of sustainable mobility, including developed and developing countries, all aspects of sustainability, and all modes of mobility, physical and virtual.*
- *Address sustainability issues created by the dominant role played by road vehicles in providing mobility in developed and developing world urban and interurban environments.*
- *Enhance knowledge of mobility needs, options and expected future changes. Determine how this knowledge can be applied to advance sustainable mobility. Identify and diffuse "best practices".*

Process Goals:

- *Build stakeholder support for our vision of Sustainable Mobility and how it might be achieved. We aim to engage stakeholders on a broad basis and create results that no stakeholder group can afford to ignore.*
- *The project deliverables will be submitted to an independent assurance process.*

II. A World Wide Effort

A GLOBAL NETWORK

Attaining sustainable mobility will require a global and concerted effort across sectors of society, modes of mobility and regions of the world. Old patterns of partnership and existing institutional solutions have proven inadequate to achieve sustainable transport systems.

Thus a key element of the Sustainable Mobility Project is to engage stakeholders from all parts of society and all regions of the world, to gauge their opinions on the current state of mobility and on how to make it sustainable. The aim is to build genuine and continuing dialogue with a broad range of stakeholders and to lay the foundation for a permanent global network of people with a shared stake in sustainable mobility.

"Sustainable Mobility is an important issue that cannot be solved by a single corporation and /or one government. It is essential to have this kind of communication"

Sao Paulo, 6 April 2001

STAKEHOLDER DIALOGUES

From November 2000 to October 2001, the project convened eight stakeholder dialogues on four continents. The dialogues in Tokyo, Brussels, Washington D.C., Saõ Paulo, Prague, Beijing, Cape Town, and Manila yielded valuable insights and constitute the first building blocks in this worldwide network. Representatives from government, cademia, labor, consumers and non-governmental organizations were among those whose opinions were solicited. The dialogues added local perspectives that have enriched the project and increased its relevance to average citizens. The dialogues, conducted as facilitated discussions, provided input to the Mobility 2001 analysis.

"I shall be more aware of the other dimensions of the issues thanks to the dialogue. [...] It gave me an opportunity to meet with various groups that I don't usually meet with and gain more knowledge and insight into their thoughts"

Prague, 4 May 2001

Furthermore, the project is utilizing electronic communications to maintain and expand the network, enabling people from all continents to share their opinions on sustainable mobility and to assess the progress of the project.

COMMUNICATIONS OUTREACH

The project is also involved in on-going discussions with various political institutions and other external parties. So far, we have conducted meetings with high-ranking decision-makers in Europe, the U.S. and Asia. The involvement of experts from academia, governmental and international agencies, non-governmental organizations and business – including other transport modes – is considered crucial in supporting the relevance and quality of the project's final product.

III. A Snapshot Of World Mobility

MOBILITY 2001

Phase 1 of the project culminated in the publication of Mobility 2001, a comprehensive report on the state of mobility and its sustainability, worldwide, at the end of the Twentieth Century. Published in October 2001, the report was prepared by a 40-person team assembled by the Massachusetts Institute of Technology and Charles River Associates, under contract with the WBCSD. Over 10,000 copies of the full report have been distributed, and more are being printed. The full 200-page report, as well as a 30-page Overview and a three-page Executive Summary, are available on the project website at www.SustainableMobility.org

BACKGROUND

In early 2000, several member firms of the WBCSD decided to "take the pulse" of world mobility. They wanted to know just how mobile people and goods really are in various regions; how this mobility is changing; and the extent to which mobility threatens to become unsustainable, if it is not already. These companies, which include six of the world's 10 largest firms, wanted to understand how they might help assure that mobility is sustainable. As a starting point, the companies asked for a baseline report, developed at arm's length, which would describe mobility conditions as they now exist in both developed and developing countries.

SELECTED HIGHLIGHTS FROM MOBILITY 2001

Mobility is an essential human need. Human survival and societal interaction depend in profound ways on the ability to move people and goods. Efficient mobility systems are essential facilitators of economic development — cities could not exist and global trade could not occur without systems to transport people and goods cheaply and efficiently.

Mobility systems currently are significant contributors to congestion, deaths, injuries from accidents, climate change, resource exhaustion, public health problems created by air pollution and noise, and ecosystem collapse. Mobility systems may also perpetuate social inequities by offering a very limited range of choices to the vulnerable sections of society, such as the poor and the elderly.

PERSONAL MOBILITY

In virtually all developed-world urban areas, the automobile plays the dominant role in providing urban mobility. Auto ownership and use has grown substantially over the last 50 years. This, in turn, has facilitated suburbanization and lower density development, damaging public transport's competitiveness. Though public transport remains important, especially in Europe and Japan, its share of total developed-world passenger miles has been decreasing almost everywhere.

- Emissions from motor vehicles account for much of the air pollution in urban areas and for the majority of global transportation-related greenhouse gas emissions.
- In the next two decades, aging populations in Japan, the United States, and Europe will create a significant pool of older people with mobility needs that the current automobile-dependent system will be ill-equipped to serve.
- Congestion appears to be increasing. Though reliable cross-national data are hard to find, there are indications that levels of congestion are being perceived as increasingly disruptive by the general public.

Motor Vehicle Contribution (%) of Total Air Pollutants in Selected Developing Country Cities

City	Year	CO	HC	Nox	SO2	SPM
Beijing	1989	39	75	46	NA	NA
	2000	84	NA	73	NA	NA
Bombay	1992	NA	NA	52	5	24
Budapest	1987	81	75	57	12	NA
Cochin, India	1993	70	95	77	NA	NA
Delhi	1987	90	85	59	13	37
Lagos, Nigeria	1988	91	20	62	27	69
Mexico City	1990	97	99	53	33	75
	1996	77	22	21	35	26*
Santiago	1993	95	92	69	46†	85
	1997	71	14	15	11	86‡
Sao Paulo	1990	94	89	92	64	39

Sources: WRI (1996); West et al. (2000); CONAMA (1998); Fu and Yuan (2001).
* PM10.
† Does not include evaporative emissions from refueling.
‡ PM10, includes fugitive road dust.
NA: Data not available

• A range of strategies is being tried to offset the adverse impacts of motor vehicles. These include traffic management strategies, promoting the increased use of public transport, the use of Intelligent Transportation Systems to increase the capacity of existing highway infrastructure, and real-time pricing of transportation facilities.

DEVELOPING WORLD

The developing world is urbanizing and motorizing at a very rapid rate. Cities, such as the megalopolises of India and China that are already supporting a large fraction of the world's population, are growing and motorizing so rapidly that they have not had the time or the money to build new infrastructure or to adapt to new technologies. Further, the geographic spread of urban areas in the developing world is undermining the ability of public transport systems to provide the services on which most developing-world urban dwellers rely for the bulk of their mobility needs. As a result:

• Mobility, already poor for most developing-world urban dwellers, is declining. Pollution, much of it transport-related, is at extremely high levels and is growing worse. Transport-related carbon dioxide emissions in the developing world are growing rapidly and will surpass developed-world carbon dioxide emissions in little more than a decade if present trends continue. Deaths and injuries from transport-related accidents occur at substantially higher rates than in the developed world.

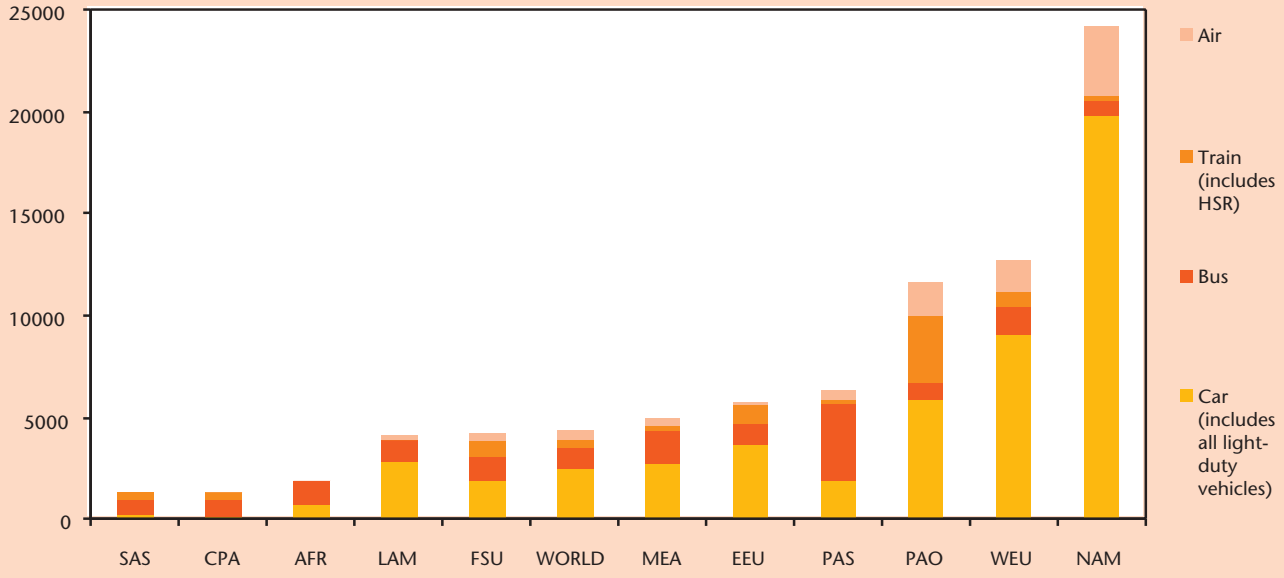
INTERCITY TRAVEL

Intercity passenger travel accounts for a relatively small share of total trips but for a much larger and growing share of total passenger-kilometers. Air transport accounts for a rapidly growing share of intercity travel in both the developed world (where it is already significant) and the developing world. In Japan and Europe, high-speed rail plays a significant and growing role in intercity travel (4% of all passenger kilometers in Japan and about 1% in Europe). As a result:

• Although many airports are becoming overcrowded, citizen opposition prevents their expansion or the construction of new airports. Airport noise is a perennial significant concern. In addition, airport-related emissions of pollutants, such as nitrogen oxides, are attracting growing attention in many urban areas.

• Air transportation is currently responsible for between 8 and 12% of transport-related carbon emissions. Since these emissions occur at high altitudes, they have a disproportionate influence on global climate compared to the same emissions on the earth's

Current levels of mobility in different regions of the world
Passenger-km/person/year

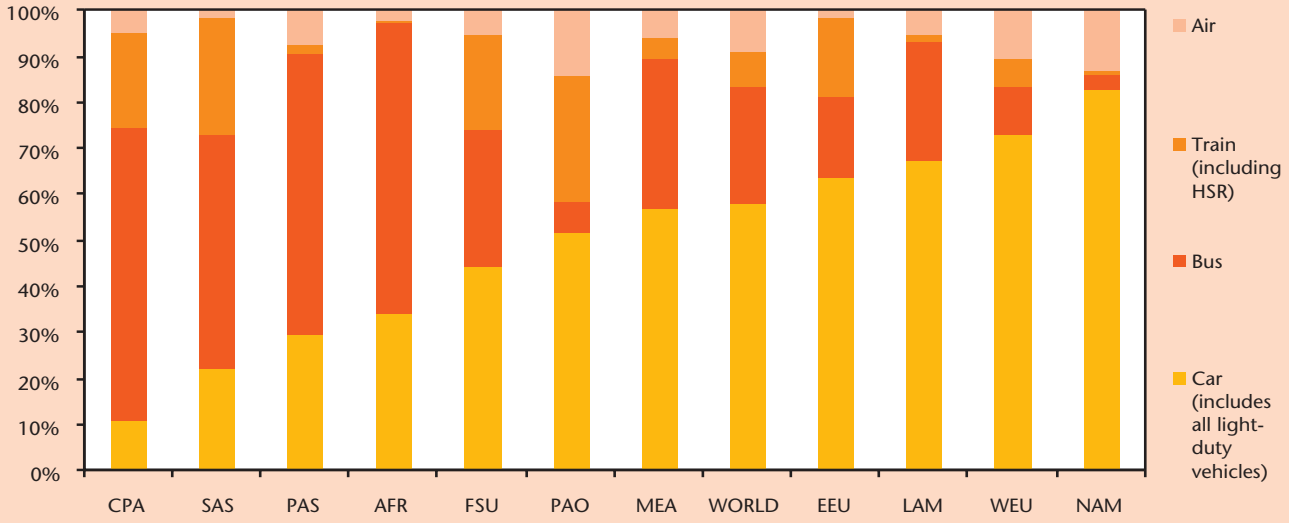


Source: Updated database based on Schafer (1998).

Key:
CPA–China and other centrally planned Asia
SAS–Bangladesh, India, Pakistan
PAS–Pacific Asia
AFR–Kenya, Nigeria, South Africa, Zimbabwe, and other Sub-Saharan Africa
FSU–Former Soviet Union
PAO–Australia, Japan, and New Zealand
MEA–Middle East and North Africa
EEU–Eastern Europe
LAM–Latin America and Central America
WEU–European Community, Norway, Switzerland, and Turkey
NAM–Canada and United States

Source: Updated database based on Schafer (1998).

Modal share of passenger-kilometers across the different world regions



Key:

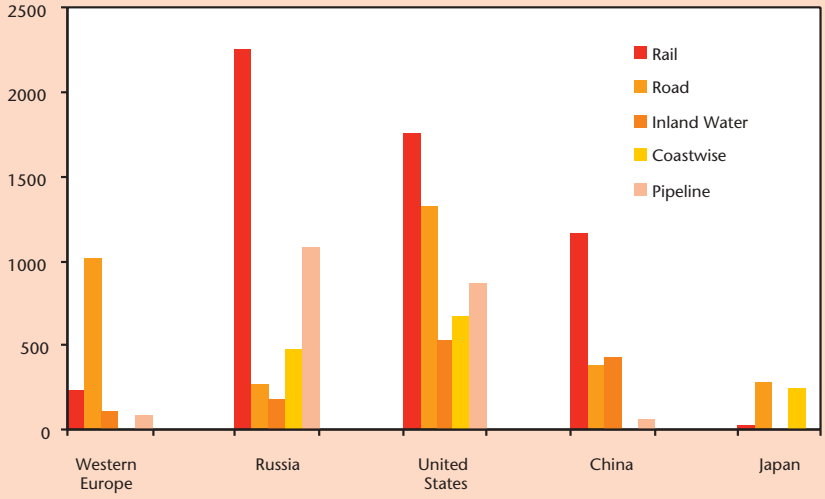
CPA–China and other centrally planned Asia
SAS–Bangladesh, India, Pakistan
PAS–Pacific Asia
AFR–Kenya, Nigeria, South Africa, Zimbabwe, and other Sub-Saharan Africa
FSU–Former Soviet Union
PAO–Australia, Japan, and New Zealand
MEA–Middle East and North Africa
EEU–Eastern Europe
LAM–Latin America and Central America
WEU–European Community, Norway, Switzerland, and Turkey
NAM–Canada and United States

Source: Updated database based on Schafer (1998).

surface. Since air travel is projected to increase rapidly, the importance of aircraft-related greenhouse gas emissions is expected to grow.

• High-speed rail shows the potential of providing an alternative to short air trips (less than 500 km). However, high- speed rail needs significant investments and can compete successfully with air and auto alternatives only in a set of particularly favorable economic environments.

Freight traffic in selected countries, early 1990s
Billions of freight tonne-km/yr



Source: BTS 1997, pp. 250–51.
Note: Early 1990s—varies by country (1991, 1993, or 1994).

FREIGHT MOBILITY

The ability to transport large volumes of goods long distances at very low costs enables cities to exist, farmers to find markets for their crops, firms to reap the advantages of specialized production, and consumers to have access to a vast variety of goods at affordable prices. As a result:

• Although freight transportation is relatively energy efficient, it uses an estimated 43% of all transportation energy. Improvements in the emission characteristics of freight-hauling vehicles are being offset by the growth in freight movements, particularly growth in high-emission truck and air freight movements, often at the expense of lower-emission rail movements.

• Vehicles transporting freight also contribute significantly to emissions of conventional pollutants, greenhouse gas emissions, traffic congestion, noise, and accidents. Further, freight-handling facilities are major users of land, especially in and near cities.

INSTITUTIONAL CAPABILITIES

The "overarching" challenge to achieving sustainable mobility, according to the report, is creating the institutional capacity to address the complex, long-term mobility issues identified in Mobility 2001; developing consensus about significant changes in the structure and deployment of mobility systems around the world; and designing, implementing and monitoring those changes. Current capabilities will not get the job done. These capabilities, more than anything else, will determine the speed with which the main mobility issues are addressed or whether they get addressed at all.

SCORECARDS FOR DEVELOPED AND DEVELOPING COUNTRIES

Mobility 2001 suggests 13 sustainability measures on which to base a general assessment of levels and trends in various aspects of mobility in developed and developing countries. The measures are not ranked in order of importance. For each of the measures, a color is used to indicate average performance:

-  means "unacceptable and/or dangerous"
-  means "of concern, needs improvement"
-  means "acceptable (or about to become so)"

Symbols are used to indicate the general trends:

- "+" means "situation is improving"
- "-" means "situation is deteriorating"
- "=" means "no clear direction"
- "?" means "direction unknown"

Access to means of mobility:

Privately-owned motor vehicles are typically the most flexible means of providing mobility but, in many parts of the world, the associated costs are too high for many people who must use other, less flexible modes, including walking, cycling or public transport. Improvements to mobility could come from, for example, reducing vehicle costs and improving the flexibility and reach of public transport systems.

	Level	Direction
Developing World		+
Developed World		+

Equity in access:

Increasing reliance on privately owned motor vehicles means that those without access to such a vehicle, such as the poor, the elderly, the disabled and youth, may be seriously disadvantaged in their ability to secure jobs and services. The limitations of conventional public transport in cities increasingly tailored to the private vehicle only serve to accentuate this risk.

	Level	Direction
Developing World		?
Developed World		+

Appropriate mobility infrastructure:

Inadequate infrastructure seriously impedes economic and social development, particularly in the developing world. Extensive passenger rail networks exist only in Asia and Europe and general transport provision in the developing countries lags well behind that of the developed world. Problems include lack of capacity, poor connectivity, the lack of bridges and inadequate road surfaces.

	Level	Direction
Developing World		–
Developed World		–

Inexpensive freight:

As urban populations grow, there is greater need to move raw and semi-finished materials from where they are found and processed and to ship finished goods to market. However, the volume of freight and freight-moving vehicles is becoming so great in many areas that they are major competitors for scarce infrastructure capacity and also major sources of air pollution. The growth of e-commerce still depends on physical delivery.

	Level	Direction
Developing World		+
Developed World		+

Congestion:

Congestion results from a mismatch between available road capacity and the traffic that attempts to use it at a given time. Society is unable or unwilling to reschedule activities more uniformly through the day and night. Congestion is more of a peaking problem rather than one of inadequate capacity. The user who enters the road network during peak travel periods does not pay the full cost that his decision imposes on others.

	Level	Direction
Developing World		–
Developed World		–

Use of non-renewable energy:

Fuels derived from petroleum now account for more than 96% of all the energy used in transportation, and there has been no sign of any decrease in that share. Projections put transport-related consumption levels in 25 to 30 years at twice the level of today.

	Level	Direction
Developing World		=
Developed World		=

Greenhouse gas emissions:

Carbon dioxide is produced by the combustion of fossil fuels and is called a greenhouse gas because it is one of the atmospheric chemicals that contribute to the greenhouse effect that warms the planet. Transport from all modes contributes 28 per cent of total worldwide carbon dioxide production by humans. Transportation-related emissions of greenhouse gases are increasing virtually everywhere, and carbon emissions from transportation in the developing world are projected to equal those in the developed world by 2015.

	Level	Direction
Developing World		–
Developed World		–

Transportation noise:

Noise is often cited as the main nuisance in urban areas. One source of noise is the contact of tires on the road but this can be reduced by tire tread design and improved road surfaces. Another is that created by the vehicle through the air and this can be lowered by aerodynamic design. Aircraft also create noise.

	Level	Direction
Developing World		–
Developed World		+

Other environmental impacts:

Transportation infrastructure has a profound impact on habitats and ecosystem communities of natural species. Another problem is the migration of road salt into public water supplies. Disturbances created by traffic noise, vibrations and light can extend for some distance, disrupting essential animal behavior like feeding and reproducing.

	Level	Direction
Developing World		–
Developed World		–

Disruption of communities:

Disruption of human groupings, albeit difficult to quantify, can occur when a new road or railway line bisects an established community. Besides, there are relatively fewer opportunities for serendipitous interactions in communities dominated by car travel.

	Level	Direction
Developing World		–
Developed World		–

Safety:

The cost in human lives, injuries, and suffering attributable to highway and road crashes is high. On average, in the US and Western Europe, a person dies in a road accident every six minutes. The situation in developing countries is much worse. The rates of deaths and serious injury in these countries typically exceed those in developed countries by at least a factor of ten, and sometimes much more.

	Level	Direction
Developing World		–
Developed World		+

Waste:

The extent to which materials like steel, aluminium, glass, and plastics, widely used materials in vehicles, are recycled, varies a lot by region.

	Level	Direction
Developing World		?
Developed World		+

"Conventional" emissions:

In most of the developed world, the rate of decrease in per-vehicle emissions has been large enough to offset the countervailing effects of more traffic. Consequently, an overall decrease in vehicle-related emissions can be projected in the intermediate term but the reverse is true of the developing world. Studies suggest that about half of the total fleet emissions come from 5-10 per cent of the vehicles. The impact of new legislation is delayed by the turnover time of the vehicle fleet.

	Level	Direction
Developing World		–
Developed World		+

FINAL THOUGHTS

The desirable characteristics of automobile systems should be preserved whilst the non-sustainable characteristics should be reduced or eliminated. The economic sustainability of rail passenger systems, which can be detrimental to the overall environment, remains a major concern. Where new and dedicated passenger rail routes cannot be built, passenger trains must share the track with freight trains.

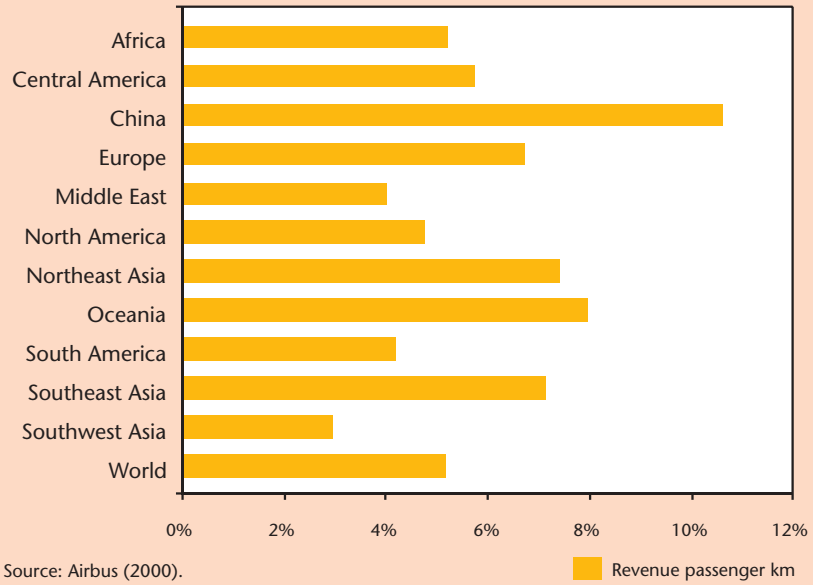
Air travel is confronting the consequences of its own success and expansion of capacity could be difficult. Air traffic control systems are heavily over-loaded and, in some areas, are burdened with outmoded, productivity-draining jurisdictional arrangements.

Over the last 50 years, trucks have eclipsed railroads in the movement of intercity freight in the developed world. Globally, trucks emit some 30 per cent of all transportation-related carbon emissions and are major sources of noise and congestion. Freight uses a substantial and increasing share of all transportation energy.

Most discussions of the challenges to making mobility sustainable focus on the role of technology. Energy-efficient "super cars"; transportation fuel systems based on hydrogen; magnetically levitated trains that speed people between cities using comparatively little energy; telecommunications technologies that tell drivers how to avoid congestion and that automatically charge the social cost of our personal mobility choices are a few of the many ideas about the future.

These technological possibilities are intriguing, but history suggests that something far more mundane will actually determine the pace and direction of change in mobility systems -- institutional capabilities. Political institutions determine which transportation modes receive favors through subsidies, regulations and protection from competition. They also determine the type and cost of fuels that will be used to power vehicles. Political and social institutions exert enormous influence over whether transportation infrastructure can be built, how long it takes and also what it costs to build. Economic institutions, including large corporations, can either take the lead in encouraging change or slow developments, making change more difficult and expensive.

Annual compounded growth in air traffic by region (1985–1999)

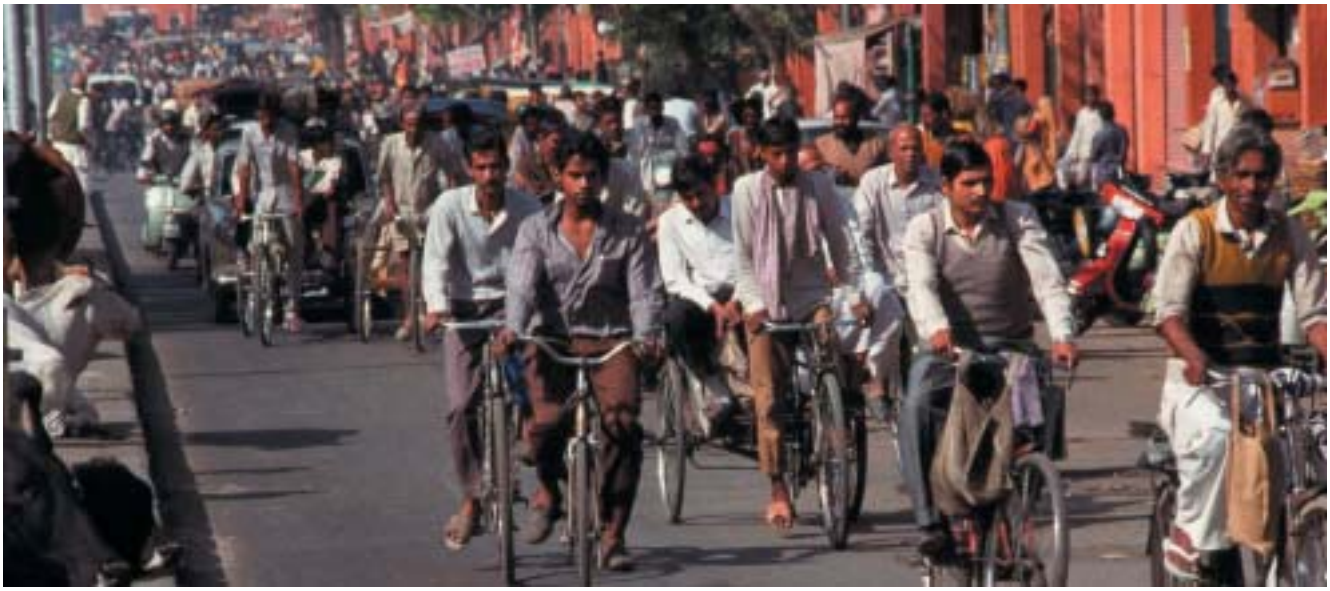


Source: Airbus (2000).

"Our primary objective in studying the issue of sustainable mobility is to develop a global sense of direction in mobility "

Mr. Tom Gottschalk,
Executive Vice President of Law & Public Policy, General Motors

IV. The Grand Challenges



The Mobility 2001 report concludes with a set of "grand challenges" that, being successfully met, would go a very long way to assure that mobility is sustainable. The Sustainable Mobility Project has adopted these challenges as a baseline for its future work. The "grand challenges" come in three different groups:

1. Challenges that stakeholders expect industry to take a major role in addressing because of industry's special expertise and/or the impacts of specific products:

- Adapt the personal use motor vehicle to the future accessibility needs/requirements of the developed and developing worlds (capacity, performance, emissions, fuel use, safety, materials requirements, waste, ownership structure, etc.).
- Drastically reduce carbon emissions from the transportation sector, which may require phasing carbon out of transitioning from petroleum-based fuels to a portfolio of other energy sources.

2. Challenges to sustainable mobility that cannot be credibly addressed without the significant involvement of other modes:

- Provide accessibility for those not having access to personal motor vehicles in both the developed and developing worlds; provide a reasonable alternative for those who do have access to personal motor vehicles – i.e. "reinvent" the relationship between public transport and the private car.
- Resolve the competition for resources and access to infrastructure between personal and freight transportation in the urbanized areas of the developed and developing worlds.
- Anticipate congestion in inter-city transportation, and develop a portfolio of mobility options for people and freight.

3. Challenges that transcend any one mode or region:

- "Reinvent" the process of planning, developing, financing, and managing mobility infrastructure.
- Improve institutional capability to identify, build consensus about how to solve, and implement approaches that promote sustainable mobility.
- Ensure that our transportation systems continue to play their essential role in economic development and, through the mobility they provide, serve essential human need and enhance the quality of life.

8 GRAND CHALLENGES

- *Adapting vehicles to the evolving requirements on emissions, fuel use, capacity, ownership structure.*
- *Reducing carbon emissions.*
- *Reinventing the relationship between public transport and the private car.*
- *Resolving the competition between personal and freight transport for the use of infrastructure.*
- *Tackling congestion.*
- *Reinventing the process of planning, developing and managing mobility infrastructure.*
- *Building institutional capacity.*
- *Ensuring transport systems serve essential human needs.*

V. The Way In Which We Move Ahead

A SET OF WORK STREAMS

To respond to the grand challenges, the project's working group has established a set of work streams focused on various elements of mobility, in the context of sustainability, which will be explored throughout the main phase of the project.

Each of the work streams is managed by an Action Team with representatives from the member companies and the WBCSD, but also, in some cases, involving external partners. Indicators of sustainable mobility, selected by the project after extensive consultations, will guide the action teams and also be used to monitor team progress. Work streams will address the supply and demand aspects of personal and freight mobility, including infrastructure issues. They will consider social, economic and political institutional capabilities, which Mobility 2001 considers the "overarching" challenge to achieving sustainable mobility. When these tasks are accomplished, the project will focus on mobility in both its urban and also its long-distance contexts, in developed and developing countries.

Because one of the main purposes of the project is to develop visions of sustainable systems of mobility in 2030, a work stream is dedicated to this complex task. Starting with a straw-man vision, the work streams will work together with this work stream over the next 18 months to envision more solid pictures of what the future may hold. Scenarios will be a feature of this work stream, as will a series of mobility workshops involving a range of partners and stakeholders from developing and developed countries.

10 WORK STREAMS

1 ***Indicators***
Provide a method for monitoring progress toward the vision of sustainable mobility.

2 ***Vehicle design and technology***
Assess how developments in road vehicle technology and design can affect sustainability.

3 ***Fuels***
Explore the options for making fuels both sustainable and affordable.

4 ***Infrastructure***
Examine how changes in road infrastructure affect sustainability.

5 ***Demand for personal mobility***
Assess how the developments in vehicle design and technology, fuels and infrastructure, population growth and urbanization, may change the demand for personal transport.

6 ***Demand for goods and services mobility***
Assess how the developments listed above may affect the demand for mobility of goods and services.

7 ***Policy measures***
Identify policy measures which influences the demand for the mobility of people and goods; identify institutional barriers to mobility and suggest how they might be overcome.

8 ***Urban context***
Describe how the demands for personal mobility and for goods and services will evolve over the next 30 years in the urban context.

9 ***Long-distance context***
Evaluate how the demands for personal mobility and for goods will evolve over the next 30 years in the long-distance context.

10 ***Scenarios, vision and workshops***
Develop Scenarios to inform the other work streams and to develop a vision of sustainable mobility. The vision development is based on an interaction with the other work streams and by engaging partners through a series of workshops.

Stream by Stream

WORK STREAM 1 - INDICATORS

Chair **Norsk Hydro**
Timeframe **March - July 2002**

OBJECTIVE

WS 1 agrees on a set of 11 indicators that provide a method for monitoring progress towards the vision of sustainable mobility. The aim is to produce indicators that at least are: mode/regionally appropriate (i.e. measures that are relevant to particular places), understandable, timely, relevant to decision making, and allow relative comparison and tracking of trends. The set of 11 indicators is considered "work in progress" since it will be constantly reflected against the content of the remaining work streams – and adapted if deemed necessary to do so.

STAKEHOLDER ENGAGEMENT

WS 1 is conducting a large number of one-on-one meetings with relevant stakeholders from academia, NGOs, politics and business.

WORK STREAM 2 - TRANSPORT VEHICLE DESIGN AND TECHNOLOGY

Chair **Volkswagen**
Timeframe **March - October 2002**

OBJECTIVE

WS 2 will determine the potential impact on the sustainability of mobility of design and technology developments. A first draft report is expected for September 4, 2002 while the final report is due November 1, 2002. Tight cooperation and exchange with WS 3 will be achieved through constant information exchange and alignment of the time lines for output.

STAKEHOLDER ENGAGEMENT

Input from suppliers, research engagement institutes and related industries (developed and developing countries).

WORK STREAM 3 - TRANSPORT VEHICLE FUELS

Chair **Shell and Toyota**
Timeframe **April - November 2002**

OBJECTIVE

WS 3 will review the options for making available transportation fuels in the 2030 timescale which are both sustainable and affordable in both developed and developing regions of the world. A first draft report is expected for September 17, 2002 while the final report is due November 2002.
Tight cooperation and exchange with WS 2 will be achieved through constant information exchange and alignment of the time lines for output.

STAKEHOLDER ENGAGEMENT

Informal input will be sought from a wide range of industry experts, academics and governmental organizations to supplement data already available in the public domain.

WORK STREAM 4 - INFRASTRUCTURE

Chair **General Motors**
Timeframe **June 2002 - March 2003**

OBJECTIVE

WS 4 will determine the infrastructure requirements created by the developments in transport technology and design and by the impacts of the changes in fuels used by transport analyzed in WS 2 and 3. It will also show the potential impact on sustainable mobility of addressing these requirements.

STAKEHOLDER ENGAGEMENT

Input envisaged from other modes (sea, air, rail) and relevant research bodies and inter-governmental organizations.

WORK STREAM 5 - DEMAND FOR PERSONAL MOBILITY

Chair **Ford and Honda**
Timeframe **June 2002 - June 2003**

OBJECTIVE

WS 5 will assess the impact on the demand for personal mobility of (a) the above developments in transport vehicle design and technology, fuels used in transport, and associated infrastructure requirements; and (b) expected developments in population (both total and age structure), urban form, growth in per capita income, changes in income distribution, etc.

This work stream also will be the focus of the project's effort to assure that it is devoting appropriate attention to the mobility needs of developing world countries. To this end, a work program is being developed to increase the information about these needs and to assure that this information is being appropriately interpreted. It is anticipated that one or more conferences will be held in the developing world to aid in this.
Since the underlying "critical drivers" for personal mobility demand coincide with those for good mobility demand, it may be an option to merge WS 5 and 6 once the advanced stages of these work streams have been reached.

STAKEHOLDER ENGAGEMENT

Input envisaged from stakeholders with expertise in city planning, new innovative solutions and specific regional circumstances.

WORK STREAM 6 - DEMAND FOR GOODS AND SERVICES MOBILITY

Chair **DaimlerChrysler**
Timeframe **June 2002 - June 2003**

OBJECTIVE

WS 6 will assess the impact on the demand for goods and services mobility of (a) the above developments in transport vehicle design and technology, fuels, and infrastructure; and (b) expected developments in population (both total and age structure), urban form, growth in per capita income, changes in the composition and structure of industry, changes in logistics requirements.
Since the underlying "critical drivers" for goods mobility demand coincide with those for personal mobility demand, it may be an option to merge WS 5 and 6 once the advanced stages of these work streams have been reached.

STAKEHOLDER ENGAGEMENT

Input envisaged from stakeholders covering international package delivery service, shipping, and freight-hauling railroads.

WORK STREAM 7 - POLICY MEASURES AND INSTITUTIONAL BARRIERS

Chair **BP and Michelin**
Timeframe **July 2002 - 1st half of 2003**

OBJECTIVE

WS 7 will identify the range of policy measures that appear to be available to influence the demand for personal mobility and the demand for goods and services mobility, describe what is known about their effectiveness under various circumstances, identify the institutional barriers to their use as well as the institutional barriers to the implementation of other actions showing promise for improving the sustainability of mobility, and suggest how these institutional barriers can be overcome and the consequences for achieving sustainable mobility if they are not.

STAKEHOLDER ENGAGEMENT

Input envisaged from relevant governmental and inter-governmental bodies, and from other actors with experience from relevant cases.

WORK STREAM 8 - MOBILITY IN THE URBAN CONTEXT

Chair **Nissan and Volkswagen**
Timeframe **Anticipated completion June 2003**

OBJECTIVE

WS 8 will project how the demand for personal mobility and for goods and services mobility might evolve over the next 30 years in the urbanized areas of the developed and developing world. We will assess the impact of various patterns of evolution on the sustainability of mobility and identify actions that will render mobility more nearly sustainable.
Due to the complexity in WS 8 and 9, these two work streams may be merged once the Sustainable Mobility Project will have reached advanced stages with input from the previous work streams.

STAKEHOLDER ENGAGEMENT

Input envisaged from actors with experience from personal and goods transport systems in urban settings.

WORK STREAM 9 - MOBILITY IN THE LONG DISTANCE CONTEXT

Chair **To be decided**
Timeframe **Anticipated completion June 2003**

OBJECTIVE

WS 9 will project how the demand for long-distance personal mobility and long-distance goods and services mobility might evolve over the next 30 years in the long-distance of the developed and developing world. We will assess the impact

of various patterns of evolution on the sustainability of mobility and identify actions that will render mobility more nearly sustainable.

STAKEHOLDER ENGAGEMENT

Input envisaged from other modes (air, sea, rail).

WORK STREAM 10 - SCENARIOS, VISION AND WORKSHOPS

Chairs **Shell and Ford**

Timeframe **June 2002 - August 2003**

OBJECTIVE

WS 10 will develop scenarios which will inform the other work streams, a vision which can evolve as the project develops, and design a series of 'Mobility Workshops' that will engage stakeholders and add to the development of the vision.

STAKEHOLDER ENGAGEMENT

We envisage that a broad range of stakeholders will be involved through the Mobility Workshops.

The work streams will all feed into a Final Synthesis that will assess the impact of various patterns of evolution on the sustainability of mobility and identify actions that will render mobility more nearly sustainable.

ASSURANCE PROCESS

An Assurance Process is a feature of all WBCSD member-led projects. Members are selected by the WBCSD. The Assurance Group, associated with the Sustainable Mobility Project, consists of eminent individuals, generally experts in some facet of mobility, who are reporting directly to the WBCSD regarding the integrity and quality of the project's work.

The Assurance Group is chaired by Simon Upton, chair of the OECD roundtable on sustainable development. Other members are: David Ashley, Principal Group Transport Planning Manager, Sinclair, Knight, Merz Pty Ltd, Australia; Dr. Peter Jones, Director, Centre for Sustainable Development, University of Westminster, United Kingdom; Dr. Prof. Yoichi Kaya, Director General, RITE, Research Institute of Innovative Technology for the Earth, Japan; Dr. Rajendra K. Pachauri, Director General, Tata Energy Research Institute, India; Suzana Kahn Ribeiro, Professor COPPE/UFRJ Programa de Planejamento – Energetico, CT, UFRJ, Escola de Engenharia, Cicade Universitaria, Brazil ; Dr. Martin Wachs, Director, Institute of Transportation Studies, University of California, USA. Additional members might be appointed.

THE FINAL DELIVERABLES

The main phase of the Sustainable Mobility Project will culminate in a final report, Sustainable Mobility 2030. The final deliverables of the project will include a vision for sustainable mobility in 2030 and a set of possible pathways for getting there.

About the WBCSD

The World Business Council for Sustainable Development (WBCSD) is a coalition of 160 international companies united by a shared commitment to sustainable development via the three pillars of economic growth, ecological balance and social progress. Our members are drawn from more than 30 countries and 20 major industrial sectors. We also benefit from a Global Network of 40 national and regional business councils and partner organizations involving some 1000 business leaders globally.

Our Mission

To provide business leadership as a catalyst for change toward sustainable development and to promote the role of eco-efficiency, innovation, and corporate social responsibility.

Our aims

Our objectives and strategic directions, based on this dedication, include:

Business leadership - to be the leading business advocate on issues connected with sustainable development.

Policy development - to participate in policy development in order to create a framework that allows business to contribute effectively to sustainable development.

Best practice - to demonstrate business progress in environmental and resource management and corporate social responsibility and to share leading-edge practices among our members.

Global outreach - to contributr to a sustainable future for developing nations and nations in transit.

What is the Sustainable Mobility Project?

Sustainable Mobility is the ability to meet society's need to move freely, gain access, communicate, trade and establish relationship without sacrificing other essential human or ecological values, today or in the future. The Sustainable Mobility Project is a member led project of the WBCSD. The project aims to develop a global vision covering sustainable mobility of people, goods and services. The project will show possible pathways towards Sustainable Mobility that will answer societal, environmental and economic concerns.

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