

The rail industry in numbers

200 Members on 5 continents

2.7 billion passenger-kilometres

9.5 billion ton-kilometres

7.1 million railway staff

1,000,000 kilometres of lines worldwide

UIC in numbers

6 Regional Assemblies

7 Forums and Platforms

50 International Expert working groups

180 Cooperation projects

670 UIC Leaflets

200 reference documents

85 training sessions, conferences, seminars

Africa

5 active members
22 associate members
3 affiliate members

Asia-Oceania

9 active members
15 associate members
12 affiliate members

Europe

60 active members
33 associate members
19 affiliate members

Middle-East

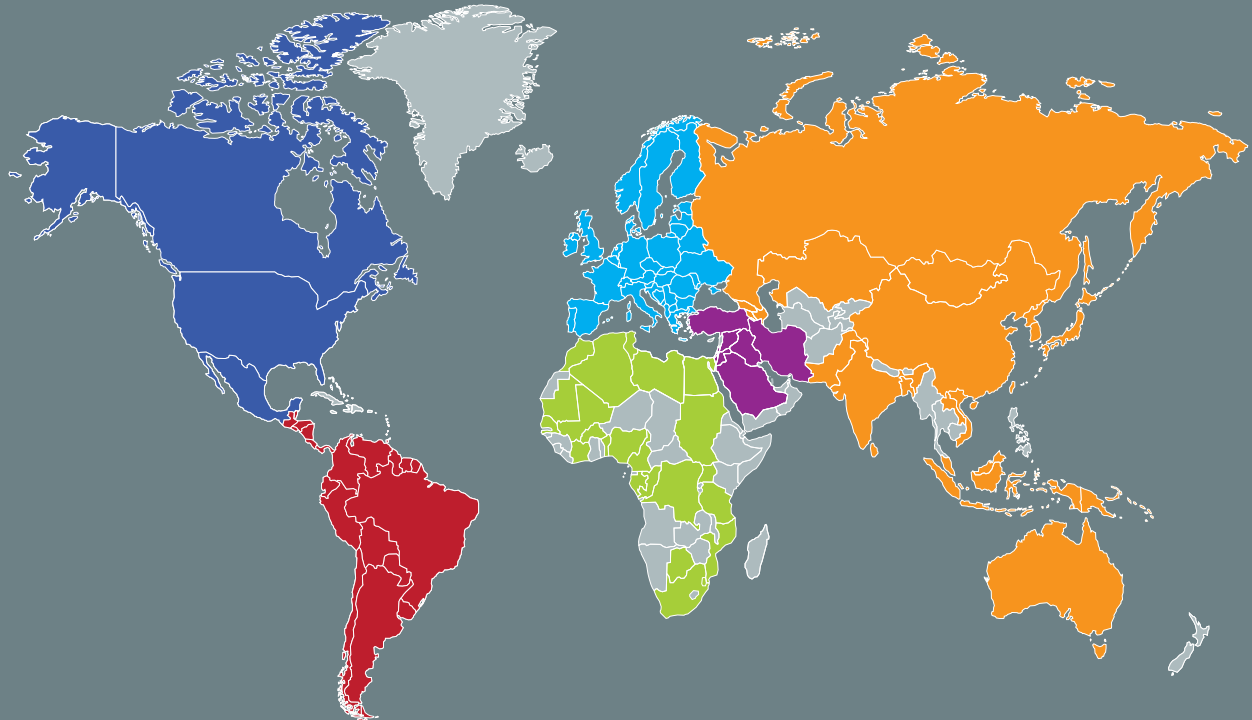
6 active members
2 associate members
4 affiliate members

North America

3 associate members
1 affiliate members

South America

2 associate members
2 affiliate members



Foreword

Rail is a low carbon transport mode, and railway operators are working hard to continually improve their environmental performance. Rail plays a positive role in society, by providing millions of green jobs worldwide and offering access to employment and leisure opportunities. Rail also benefits the global economy by enabling congestion-free access to employment and facilitating freight deliveries.

This is why we believe that rail should have a central role in the development of truly sustainable transport systems. I am pleased to present to you this brochure on Railways and Sustainable Development which captures some of the highlights of our own and our Members work in this crucial area, and summarizes our future plans for further improvement.

I encourage you to contact your national railway to learn more about their sustainable development strategies.

Jean-Pierre Loubinoux
UIC Director General

Railways could be the most important transport mode in all parts of the world in years to come. Railways, which carry many people and products at one time with less energy, will play an indispensable role in society, not only from the perspective of sustainable development, but also in terms of creating low-cost and energy efficient cities as well as improving the quality of life itself in the regions.

We, railway companies, make steady efforts every day to introduce and develop new technology to or for railways. The development of rolling stock which is energy saving and has low CO₂ emissions and the improvement of the energy efficiency of train operations by introducing regenerative brakes are two among many examples.

However, the efforts of the railway companies are not limited to the field of technology. As a matter of first priority, railway companies, we ourselves, are taking positive action to raise the level of safety, reliability, punctuality, cleanliness, and comfort to make the value of railway transport as a service, the total output, continuously higher, so that each customer, the end-user, will choose the railway as his or her own transport mode.

This brochure introduces the various characteristics of railways along with the activities of UIC, which is the world's largest and only global railway organization and consists of railway companies and railway research institutes throughout the world, briefly and with illustrations. I hope that you will read it through to the end and that it will serve to deepen your railway knowledge.

Yoshio Ishida
UIC Chairman and Vice-Chairman Japan East Railways

Introduction: Rail and Sustainable Development

In 1987, the United Nations released the Brundtland Report, which defines sustainable development as 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs'¹.

The United Nations 2005 World Summit Outcome Document refers to the "interdependent and mutually reinforcing pillars" of sustainable development as economic development, social development, and environmental protection².

This brochure highlights how the global railway sector is helping to deliver in each of these areas.

UIC Declaration and Indicators Sustainable Mobility & Transport



1. Our Common Future, Chapter 2: Towards Sustainable Development
2. 2005 World Summit Outcome Document, World Health Organization, 15 September 2005

Environmental Issues

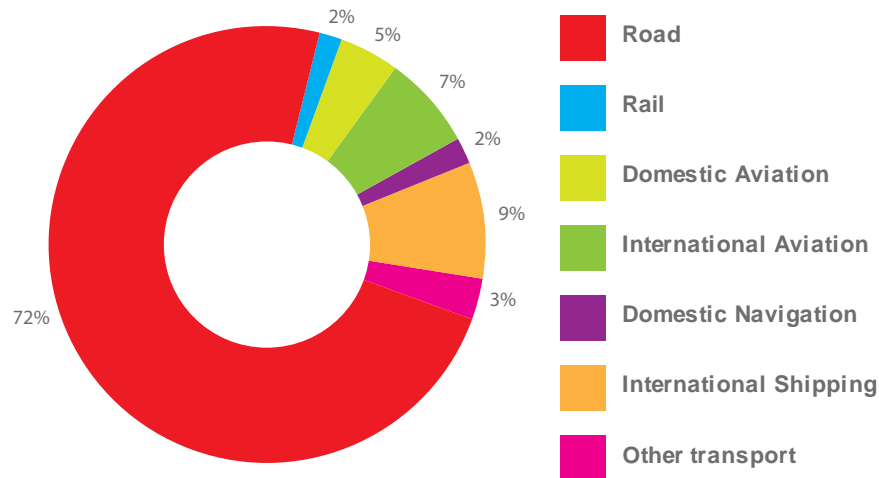
Energy, emissions and transport

Almost 20 percent of the world's total delivered energy is used in the transportation sector, where liquid fuels are the dominant source. Transportation alone accounts for more than 50 percent of world consumption of liquid fuels, and this share is forecast to increase to over 60% by 2035 over time³.

Within the transport sector, energy consumption and therefore CO₂ emissions are dominated by road, followed by aviation and shipping. Rail accounts for 2% of CO₂ emissions within the transport sector.

Transport CO₂ emissions 2008

Source: International Transport Forum, Transport Greenhouse Gas Emissions 2010



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3. IEA, International Energy Outlook 2010

The “Avoid, Shift, Improve” approach

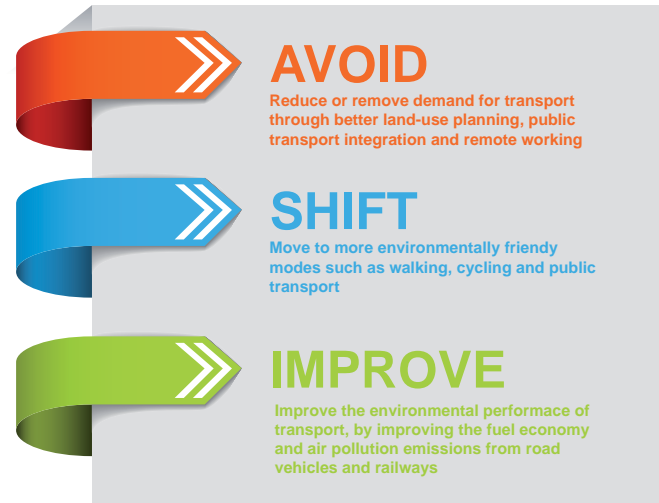
INITIATIVES AND POLICIES TO REDUCE THE ENVIRONMENTAL IMPACT OF TRANSPORT TYPICALLY FALL INTO THREE BROAD CATEGORIES - AVOID, SHIFT, AND IMPROVE. THIS SECTION DESCRIBES THIS CONCEPT AND EXPLAINS HOW RAILWAYS ARE CONTRIBUTING IN EACH AREA.

Avoid

Reducing the total demand for transport is primarily a matter of government policy, and rail has a limited role. Governments, for example, can develop compact urban communities where people live within a walk or cycle ride of work, education and leisure opportunities. Employers can also play a key role by allowing working from home to reduce commuting, and providing video-conferencing facilities to reduce business travel.

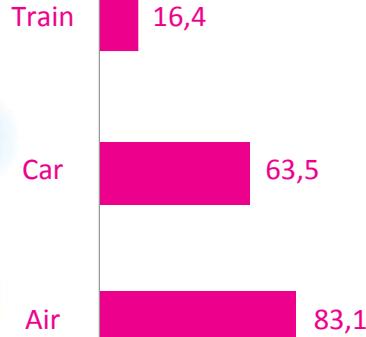
Shift

Shifting to lower-carbon modes is a crucial part of an environmental strategy for the transport sector. As a low-carbon mode, rail has a major role to play: if the railways can attract passengers from other modes, then the overall carbon footprint of the transport sector will be reduced. As the charts opposite illustrate, rail has a far lower carbon footprint than the other motorized transport modes.



Carbon footprint tools

EcoPassenger



Journey from Paris to Frankfurt Carbon dioxide (kg per passenger)

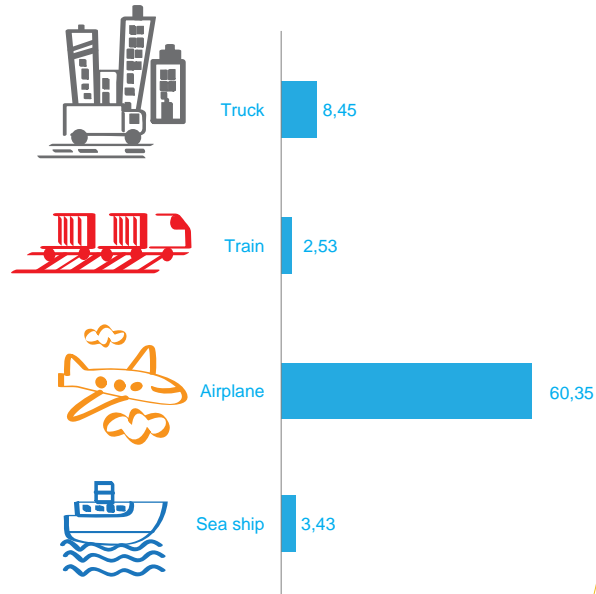
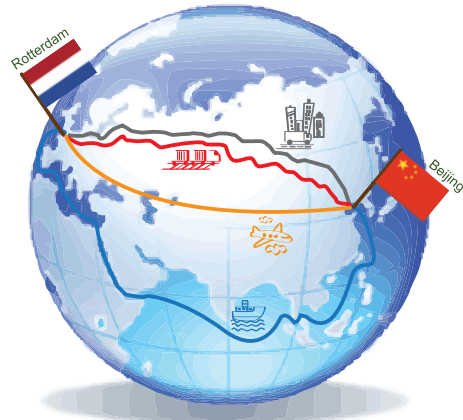
Source: www.ecopassenger.org



Journey from Beijing to Rotterdam Carbon dioxide (tonnes) Container shipment of 1 TEU

Source: www.ecotransit.org

EcoTransIT





Investment in rail to improve services

The best way to attract new passengers to rail is to provide reliable, punctual and safe services that offer value for money. Around the world, railways are investing in better rolling stock and infrastructure, and more accessible stations with better facilities. For example, in 2009 alone, European railways invested a total of €44,672 million; Kazakhstan railways invested €503 million, and Turkish and Korean railways invested €696 million and €503 million respectively⁴. Commercial innovations such as offering discounted tickets for travel booked in advance are also important for attracting new customers.

Planning for modal shift

To achieve modal shift in the long-term, it is important to plan public transport connections. Rail has an important role to play here. In China for example, rail is an integral component of new spatial planning and economic development. There are plans to extend railway length to 100,000 kilometers by 2020 – an increase of 27,000km compared with 2003. This will form a railway network covering most cities with a population over 200,000⁵.

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4. UIC, International Railway Statistics, 2009

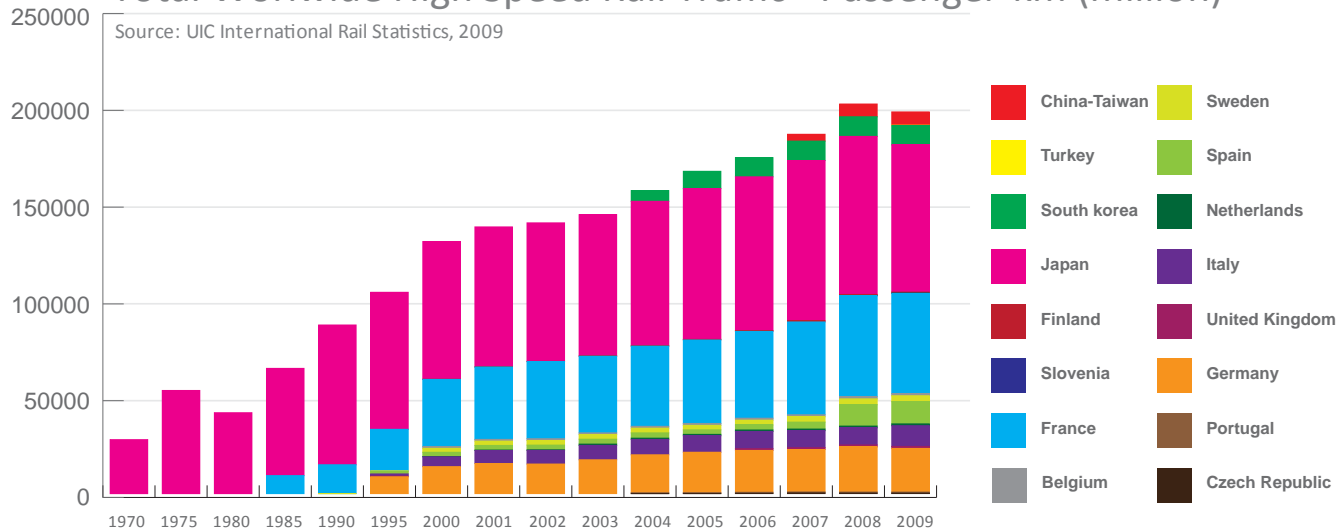
5. China Railway Construction Corporation <http://www.crcc.cn/536-1712-4104.aspx>

High Speed – Shifting Road and Air to Rail

High speed rail lines can compete successfully with short haul aviation and road, and thus dramatically reduce energy consumption, air pollution and CO₂ emissions. In Spain, for example, the new high speed line between Madrid and Seville increased the market share from 19% to 53%⁶. Rail will continue to compete strongly the passenger market as high speed rail has experienced considerable development in recent years.



Total Worldwide High Speed Rail Traffic - Passenger-km (million)



6. UNIFE, <http://www.unife.org/page.asp?pid=96>

Door-to-Door Services

RAILWAYS ARE INCREASINGLY TAKING A LEAD IN OFFERING DOOR-TO-DOOR OPTIONS FOR PASSENGERS, PROVIDING AN ALTERNATIVE TO THE CONVENIENCE OF THE CAR. IN THE NETHERLANDS, FOR EXAMPLE, THERE ARE TENS OF THOUSANDS OF CYCLE PARKING SPACES AT MAJOR STATIONS, PLUS THE “OV-FIETS”, CYCLE-HIRE SCHEME FOR RAIL PASSENGERS⁷.

In Japan, some stations have purpose-built underground, automated cycle storage facilities, adding a space-age twist to the rail journey⁸, while other countries such as the Netherlands, Germany, USA and the UK have built cycle “hubs” containing cycle hire, repair and storage.

Railways are also closely involved in other aspects of multi-modal integration. The UK has developed PLUSBUS, Europe’s only nationwide bus-rail ticketing scheme, developed entirely by private sector operators with no government subsidy⁹. There are thousands of other examples all over the world where the railways integrate with pedestrians, cars, buses, trams, to offer an easy, joined-up journey.



Bike Transit Center, Union Station, Washington DC

Freight – Shift from road to rail

The Association of American Railroads (AAR) has noted that “if just 10% of long-haul freight now moving by truck moved by rail instead, annual greenhouse gas emissions would fall by more than 12 million tons”¹⁰. In the last 12 years Germany, the Netherlands, the UK and Sweden have increased the modal share of freight railways at a pace that is more than doubling the increase of total transport volumes.

7. For information on OV-Fiets visit <http://www.ov-fiets.nl/>

8. Article and video footage available at <http://www.wired.com/gadgetlab/2009/02/crazy-bike-stor/>

9. For information on PLUSBUS, visit www.plusbus.info

10. AAR, Freight Railroads Offer a Smart, Effective Way to Reduce Greenhouse Gas Emissions, 2010



The Japanese Shinkansen trains

Improve

THE GLOBAL RAILWAY SECTOR IS WORKING EXTREMELY HARD TO IMPROVE ENERGY EFFICIENCY AND TO REDUCE CO₂, AS WELL AS REDUCE ENVIRONMENTAL IMPACTS SUCH NOISE AND AIR POLLUTION.

Energy and CO₂: Strategy and targets

The railway sector has also set ambitious long-term targets for CO₂ reduction:

- **2020:** European railways have committed to the reduction of specific CO₂ emissions from train operation by 30% and East Japan Railway Company is striving to reduce 30 % reduction of CO₂ by the year 2017.

- **2030:** European railways have committed to the reduction of specific CO₂ emissions from train operation by 50%. East Japan Railway Company is striving to reduce 50% of CO₂ emissions by the year 2030.

- **2050:** European railways will strive towards carbon-free train operation by 2050.

Examples of projects and initiatives

Here are a few examples from the railway industry around the world:

- **Europe: Energy efficient driving:** The European TRAINER project helped improve the energy efficiency of railways through driver training. Deutsche Bahn in Germany found that driver training resulted in energy savings of around 5% for both electric and diesel trains.

- **Australia: Minimizing fuel consumption:** In Australia, the Freightmiser system is an in-cab advice system that assists long-haul train drivers to stay on time and minimise fuel consumption. Industry trials have found fuel savings of between 5% and 20%, with no increase to journey times

- **Japan: Rolling stock design:** Improvements in the design of Japanese Shinkansen trains, such as optimizing the length and shape of the lead nose, significantly reducing weight and using VVVF inverters, have reduced energy consumption by 40% despite increased maximum speed.

- **USA: Regenerative braking:** Regenerative braking is a system where electric traction motors become generators, converting the energy of the train brake into usable power. In the United States these braking systems have allowed Amtrak to reduce energy consumption by 8%. Regenerative braking is also used in European and Japanese railways.

- **Sweden: Optimising the load factor:** The Swedish “Gröna Tåget” (Green Train) research shows further potential for reductions in energy consumption per seat km by 32% on the existing Stockholm to Gothenburg line through increased seating capacity and an increase in regenerative energy capacity.

Noise

Noise disturbances as well as vibrations are important issues when examining sustainable transport. Millions of people are affected by noise, especially traffic noise. Rail noise impacts tend to be limited to people living along rail network routes, and so affects far fewer people. Further, independent studies have shown that rail disturbs fewer people per unit of noise than road and air traffic¹¹. Nevertheless, noise is still a key environmental issue for railways, particularly in Western Europe and along main freight corridors, and the European Union is introducing more stringent noise requirements for railway operations.

European railways have been working on noise control measures for some time, and have defined a strategy (see box). This strategy is supported by several research projects¹³. For example, the ambitious EuropeTrain project is running extensive in-service tests of low noise technology using a freight train running across Europe across a year, to incorporate different climate and terrain conditions¹⁴.

11. The EC Working Group on Health and Socio-Economic Aspects, 2004, concluded that per unit of noise, rail disturbs sleep less than air or road traffic

12. Technical Specifications for Interoperability

13. For more information please see the noise section of the UIC website <http://uic.org/spip.php?rubrique1585>

14. For more information on EuropeTrain please see <http://europetrain.uic.org/>

Noise control strategy

Based on many years of research and experience, the railway sector’s noise control strategy is the following. A precondition, of course, is proper maintenance of the track.

- ✓ 1. Reduce the noise of all new freight vehicles by introducing TSI¹² limit value;
- ✓ 2. Promote the retrofitting of existing freight vehicles with composite brake block;
- ✓ 3. Build noise barriers and install noise insulated windows;
- ✓ 4. Pursue further solutions in special cases such as acoustic rail grinding, rail absorbers, wheel absorbers, friction modification against curve squeal and many more. The precondition is regular maintenance.

Pollution and other environmental impacts

Several other types of environmental impact arise from railway operations, ranging from air pollution from diesel trains, to soil pollution from vegetation control, through to the biodiversity impacts of infrastructure. The UIC website contains information on how the railway is tackling these, and other environmental issues¹⁵.

With regard to air quality, a study by UIC and CER¹⁶ found that heavily trafficked line sections are insignificant contributors to atmospheric concentrations of NO_x and PM₁₀. However, the contribution of very busy shunting yards to NO_x concentrations may be important, and the contribution of very busy terminal stations with a high proportion of diesel traction to both NO_x and PM₁₀ concentrations may be significant¹⁷.

Railways across Europe are working to meet stringent new emissions controls, both for new and existing vehicles, and have put forward suggestions for the most cost-effective means to tackle this issue¹⁸.



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15. For more information please see the UIC website <http://uic.org/spip.php?rubrique1586>

16. Community of European Railway and Infrastructure Companies

17. UIC / CER, Rail Diesel emissions – facts and challenges, 2006

18. For further information see UIC / CER, Rail Diesel emissions – facts and challenges, 2006

Social Issues

Employment

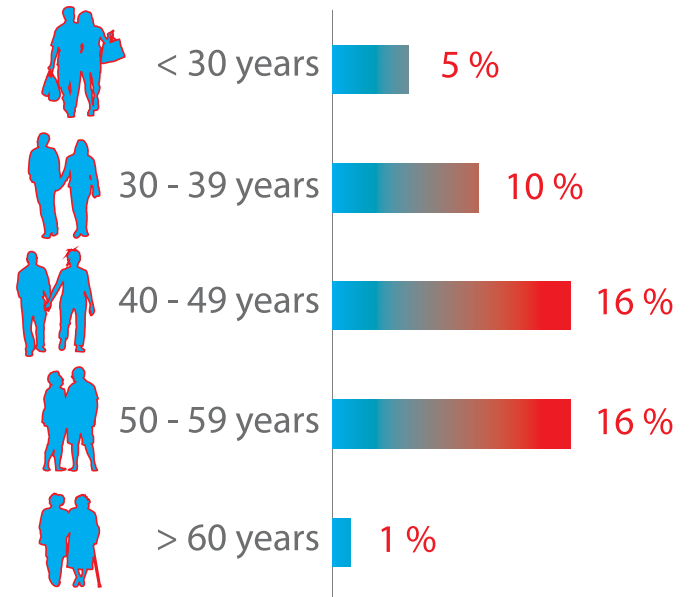
UIC MEMBERS DIRECTLY EMPLOY 7,074,672 PEOPLE WORLDWIDE¹⁹. THIS INCLUDES 2 MILLION IN CHINA, 1.4 MILLION IN INDIA AND 1.1 MILLION IN THE EU²⁰. INDIRECT EMPLOYMENT (JOBS IN THE SUPPLY CHAIN, MAINTENANCE AND OTHER SERVICES TO THE INDUSTRY) IS FAR HIGHER.

For example, the eleven Members of the European Rail Infrastructure Managers Association (EIM) directly employ over 113,000 people in Europe, while indirect employment (including maintenance staff) is estimated at 300,000 people²¹.

The majority of employees are men (roughly 88% men to 12% women). Some railway organizations such as Network Rail in the UK are attempting to redress this imbalance by public campaigns to try to bring more women into the industry²². In Germany, Deutsche Bahn have developed a “work-life balance” policy that includes outreach to women. There is a relatively broad distribution of ages within the industry. All railways actively encourage younger entrants to the industry through some form of training or apprenticeship program.

Age distribution of railway employees, 2009

Source: UIC International Railway Statistics 2009



19. UIC, International Railway Statistics 2009

20. UIC, International Railway Statistics 2009

21. EIM, Journey to the Future, 2008

22. Network Rail, <http://www.networkrail.co.uk/asp/6204.aspx>

Safety

SAFETY IS OF COURSE ONE OF THE MOST IMPORTANT SUBJECTS FOR ANY MODE WHERE THE KEY OBJECTIVE IS THE TRANSPORTATION OF PEOPLE AND PRODUCTS.

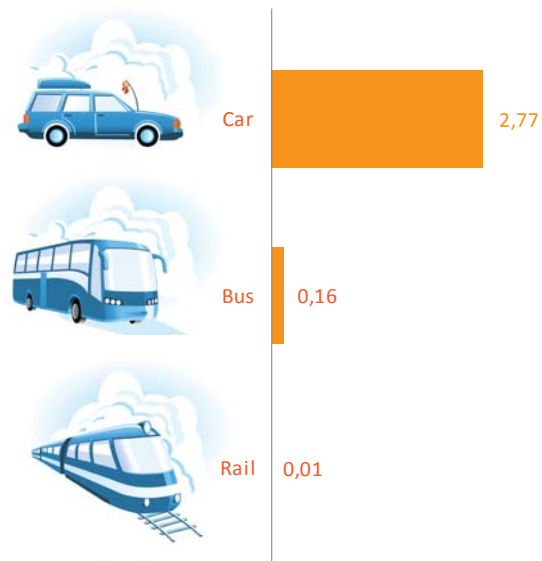
The railway sector has, broadly speaking, performed well in this area, but it continues to be a priority theme at the very heart of the development strategy on all 5 continents.

UIC has prepared a number of objectives to move the safety focus forward. These have been grouped around the core themes of 'people', 'process', 'performance' and 'communication'. The detail of these objectives can be found in the safety objectives section of the Safety Report 2006²³.

Statistical analysis is one of the key methods to monitor safety performance levels and to benchmark trends within the industry and against other transport modes. The UIC Safety Database collates key statistics in the safety field from our Members²⁴.

Deaths per billion passenger - km in Germany 2008

Source: Allianz pro Schiene, Germany 2010



23. Safety Report, UIC <http://uic.org/spip.php?article1479>, 2006

24. More information about the UIC Safety Database is available here: <http://www.uic.asso.fr/uic/spip.php?article551>

Mobility and inclusion

RAILWAYS WORLDWIDE OFFER ASSISTANCE TO PASSENGERS WITH PARTICULAR MOBILITY NEEDS, AND ARE CONSTANTLY WORKING TO UPGRADE STATIONS AND ROLLING STOCK TO BE MORE ACCESSIBLE.

For example, in addition to investment programs to improve accessibility, all European railways offer assistance for Persons with Reduced Mobility. These include telephone numbers to book assistance at stations, and information on making rail journeys through stations with step-free access²⁵.

Indian Railways has developed a priority system for booking tickets, and prioritized seating areas on board trains, for disabled passengers²⁶. Indian Railways is also in the midst of implementing an ambitious program to improve accessibility for disabled passengers at 1,560 strategically chosen stations²⁷.



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25. For a summary see <http://www.railpassenger.info/prm.html?lang=english&nompage=prm.html&fontsize=1>

26. Indian Railways concession rules: http://www.indianrailways.gov.in/view_section.jsp?lang=0&id=0,2,281,877

27. Indian Railways Plans Disabled Friendly Stations, IndiaServer.com <http://www.india-server.com/news/indian-railways-plans-disabled-friendly-7793.html>

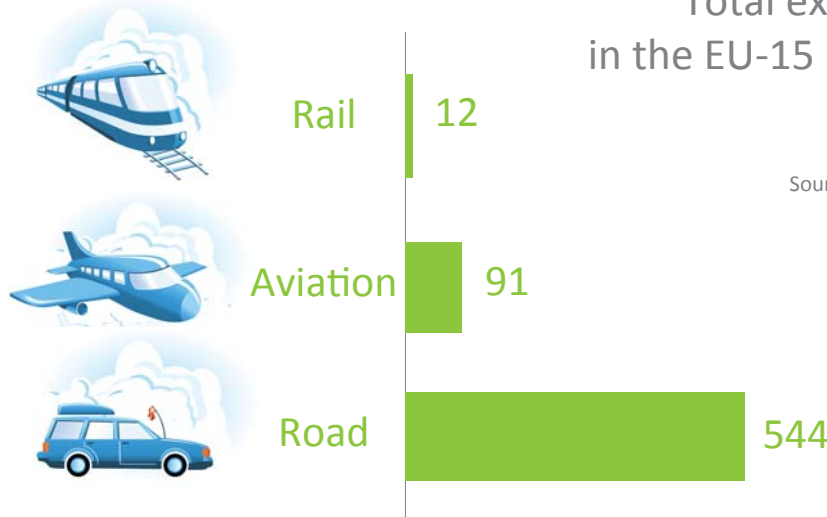
Economic Issues

Honest price, honest service

THE PRICES OF TRANSPORT IN GENERAL — AND ROAD TRANSPORT IN PARTICULAR — ARE ARTIFICIALLY LOW. TRANSPORT PRICES DO NOT COVER AIR POLLUTION AND CLIMATE CHANGE, NOISE ANNOYANCE, THE HUMAN TOLL OF ACCIDENTS, EMERGENCY AND MEDICAL SERVICES, AND HIGHER INSURANCE COSTS.

The real “marginal social costs” of all transport in 2000 in the then EU-15 plus Switzerland and Norway amounted to €650 billion, not including losses due to congestion. More than 80% of this cost is due to road traffic (see below).

External costs should be taken into account when governments and multinational funders are evaluating transportation infrastructure projects, to ensure that the true costs of transportation are included, and to allow a fair comparison between modes.



Total external costs in 2000 by mode in the EU-15 plus Switzerland and Norway

(billion euro per year)

Source: INFRAS / Institute for Economic Policy Research 2004



Congestion

Congestion is one of the most visible and profound consequences of planning policies that favor vehicular traffic over public transport. Traffic delays cost countries vast financial sums in lost productivity, not to mention wasted fuel.

In the United States, the highly-respected Texas Transportation Institute has concluded that the cost of congestion has risen from \$24 billion in 1982 to \$115 billion in 2009, and that the total amount of wasted fuel in 2009 topped 3.9 billion gallons – equal to 130 days of flow in the Alaska Pipeline²⁸.

In the UK, a government review in 2006 estimated that congestion may cost the economy of England £22 billion a year in lost time by 2025, and warned that roads were in serious danger of becoming so congested that the economy would suffer²⁹.

Rail and other public transport measures offer solutions to traffic congestion that more than justify the initial infrastructure investments that are required.



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28. Texas Transportation Institute, Urban Mobility Report 2010

29. UK Department for Transport, The Eddington Transport Study, 2006

Sustainability and Environmental Reporting

MOST RAILWAY ORGANIZATIONS AROUND THE WORLD PROVIDE A REGULAR ENVIRONMENTAL OR SUSTAINABILITY UPDATE FOR THEIR CUSTOMERS AND STAKEHOLDERS.

Approaches range from including a chapter within the more general Annual Report to producing integrated sustainability and corporate reports using the latest, state-of-the-art GRI (Global Reporting Initiative) indicators, in two or more languages. In addition, some railway organizations are active members of the United Nations Global Compact, which requires regular reporting on progress in implementing key sustainable development principles.

Here are some examples of the sustainability reports from railway organizations worldwide.
An exhaustive list is available at <http://www.uic-sustainability.org/>



ADIF, Spain:

Integrated sustainability and corporate report using GRI G3 Indicators, in multiple languages.
<http://www.adif.es>



AMTRAK, USA:

Comprehensive environmental reports and strategies
<http://www.amtrak.com>



Mobility Networks Logistics

Deutsche Bahn, Germany:

Sustainability micro-site in two languages using latest GRI indicators. Active member of UN Global Compact.
<http://www.deutschebahn.com>



Ferrovie Dello Stato, Italy:

Sustainability report using latest GRI Indicators.
<http://www.ferroviedellostato.it>



Indian Railways, India:

Environmental management section in corporate annual report.
<http://www.indianrailways.gov.in>



JR - East, Japan:

Detailed, independently scrutinized sustainability report in English and Japanese.
<http://www.jreast.co.jp>



KORAIL, South Korea:

Sustainability and corporate report using GRI G3 indicators; active member of UN Global Compact.
<http://www.korail.com/>



SBB, Switzerland:

Comprehensive sustainability and corporate reporting micro-site in multiple languages.
<http://sbb-gb2010.mxm.ch>



SNCF, France:

Combined annual report and sustainability report. Active member of UN Global Compact.
<http://www.sncf.com>

Taking it forward: The UIC Declaration on Sustainable Mobility and Transport



THIS REPORT HAS HIGHLIGHTED SOME OF THE WAYS IN WHICH RAILWAYS AROUND THE WORLD ARE STRIVING TO BECOME MORE SUSTAINABLE.

The next phase of our work at UIC is to help our member railways embed the principles of sustainable development in their operations, and to provide transparent reports on progress.

To achieve this objective, we have, in close consultation with our Members, developed the UIC Declaration on Sustainable Mobility and Transport. This consists of 18 key commitments to sustainable railway operations, supported by regular progress reports. This reporting process will enable UIC to report regularly on the sustainability of the railway industry, and allow our Members to compare initiatives and share good practice.

For more information, see the UIC website www.uic.org

To support our contribution to sustainable development and the necessary paradigm shift we shall endeavour to work towards and uphold – now and in the future - the approach and commitments set out in the statements below and to regularly report on our progress:

Meet the expectations of society

We are the backbone for sustainable mobility and transport systems in our society

- A1 Rail offers solutions to cope with the mobility and transport challenges of the future.
- A2 Rail has lower impact on climate and environment than most other transport modes.
- A3 Rail is the safest mode of transport.
- A4 Rail relieves roads and reduces congestion.
- A5 Rail has macro-economic advantages for society.
- A6 Rail enhances sustainable integration of transport and mobility modes.

Meet the expectations of customers

We provide attractive mobility and transport solutions for our customers

- B1 Rail travel and commuting increase quality and productive time.
- B2 Rail provides reliable mobility and transport.
- B3 Rail improves access to mobility.
- B4 Rail reduces the environmental footprint of its customers.
- B5 Rail is the backbone of attractive and sustainable door-to-door-mobility and -transport concepts
- B6 Rail involves its customers in developing target-group specific services.

Governance & Responsibility

We sustain the mobility and transport business through responsible leadership

- C1 Rail companies are committed to sustainability and sound corporate governance as a matter of course and to create sustainable value for their stakeholders.
- C2 Rail companies are committed to being responsible and attractive employers.
- C3 Rail companies maintain high levels of safety and security by comprehensive management.
- C4 Rail companies apply precautionary approaches to environmental challenges and support initiatives, projects and new technologies for further improved environmental performance.
- C5 Rail companies support and respect internationally accepted ethical standards, also in their supply chains and will work against corruption in all its forms, including extortion and bribery.
- C6 Rail companies maintain dialogues with their various stakeholders and report transparently about their sustainability performance.





INTERNATIONAL UNION
OF RAILWAYS

RAIL AND SUSTAINABLE DEVELOPMENT

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