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on track to A GREENER TRANSPORT FUTURE

unife THE EUROPEAN RAIL INDUSTRY



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UNIFE's commitment to sustainable mobility

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Vision

Sustainability, particularly in its environmental dimension, has always been considered a key value of the European rail industry. **Rail technologies are already 3 to 4 times cleaner than road or air transport in terms of CO2 emissions**¹, but efforts need to be intensified to tackle climate change in the upcoming decades.

UNIFE's strategy is to enable the sustainable growth of mobility both in developed and in developing countries, with rail as the backbone of a intermodal transport system in a context where urbanization must go hand in hand with sustainable development goals.

UNIFE has put into place an organisational system to proactively respond to rising environmental concerns, adapt to EU legislation and contribute to the adaptation or the creation of new standards.

Knowledge base

- Sustainable Transport Committee
- Topical Groups
- Research projects

Outreach

- EU policy-making
- International activities
- Joint activities and initiatives
- Research (ERRAC)

1 Rail Route 2050: the sustainable backbone of the Single European Transport Area, ERRAC

A solid knowledge-base

Since 1999, the **UNIFE Sustainable Transport Committee (STC)** has been the key strategic driver for the main sustainability and environmental activities undertaken by UNIFE, in collaboration with the Public Affairs unit.

Considering the increased complexity of environmental and sustainability issues, the competencies of the UNIFE Sustainable Transport Committee have grown over time but are mostly dedicated to providing even more eco-efficient products and service solutions. The Sustainable Transport Committee drafts and assures coherent and effective common positions of the rail industry in the environmental field. It is supported by several Topical Groups, which provide the technical content on the main dossiers and regularly reports to the STC.

Sustainable Transport Committee

Life Cycle Assessment Tropical Group

Chemical Risk Tropical Group Energy Efficiency Tropical Group

The Sustainable Transport Committee and its Topical Groups can rely and build on a long-established rail sector cooperation in EU-funded collaborative research projects. Research will be the cornerstone of environmental improvements and breakthroughs in the system as a whole are necessary for rail to retain its position as the most environmentally friendly transport mode. SHIFT²RAIL

The European rail sector has joined forces in SHIFT²RAIL, the first European public-private partnership initiative to seek focused research and innovation and marketdriven solutions by accelerating the integration of new and advanced technologies into innovative rail product solutions. Following endorsement from the Council in June 2014, SHIFT²RAIL will contribute to meeting the changing EU sustainable transport needs, thereby leading to significant increase in environmental performance and resilience to climate change.

In particular, SHIFT²RAIL addresses the following challenges:

- Energy efficiency technologies for the rail system;
- Infrastructure resilience to climate change and other environmental impacts;
- Noise and vibration.

More information on: www.shift2rail.org

Advocacy and outreach

UNIFE has also implemented an outreach strategy in the environmental field:

→ Active contribution to European debates on environmental topics and energy and climate policy, advocating the importance of carbon emission reduction and conveying the expertise of the European rail industry to European institutions in the drafting of legislation. In particular, UNIFE is committed to to cooperate closely with DG Environment, Climate Action, Energy, Move and Enterprise on these topics.



→ Networking actions to reinforce visibility at the international level, for

example through membership of organisations advocating sustainable and low-carbon mobility. In October 2013, UNIFE joined the SLoCaT Partnership on Sustainable Transport (SLoCaT), a multi-stakeholder partnership of over 80 organisations representing United Nations organisations, multilateral and bilateral development organisations, NGOs, academia and the business sector.

➔ Joint activities and initiatives with other transport organizations,

such as participation in events that aim to raise awareness of decision-makers on lowcarbon transport in a growing urbanisation



context. For instance, UNIFE has participated in several annual Conferences of Parties (COP) of the United Nations Framework Convention on Climate Change and organised a series of events to promote sustainable cities during the Rio+20 Conference in 2012. In November 2013, UNIFE supported and participated in Transport Day, which gathered over 150 stakeholders from all over the world. Along with over 100 organizations, UNIFE endorsed the Warsaw Statement on Low Carbon Transport and Sustainable Development, which contains recommendations on how to strengthen the integration of sustainable, low carbon transport in the UNFCCC process.





Performance of the transport sector and rail

The volume of global transport could double or even quadruple by 2050, with baseline projects seeing global CO2 emissions from surface transport grow by 80% by 2050². In the EU, the transport sector accounts for around a quarter of EU greenhouse gas emissions. This makes it the **second biggest greenhouse gas emitting sector after energy**. While greenhouse gas emissions in other sectors decreased significantly between 1990 and 2009, emissions from transport increased 28% during the same period; all transport modes increased their total emissions, except railways.

In 2009, road accounted for 71.7% of total CO2 emissions from the transport sector in the EU, while navigation accounted for 14.6% and aviation for 12.3%. Railways generated only 0.6% of total CO2 emissions from the transport sector³.

Did you know that to travel from London to Brussels, rail will produce only around 10% of the emissions per passenger of a plane journey for the same journey?

Shifting strategies needed

The 2011 White Paper "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system" emphasised that a reduction of at least 60% of 1990-level GHGs by 2050 is required from the transport sector. As a mode with average specific emissions at least 3-4 times lower than road or air transport, rail plays a crucial role in achieving the this ambitious objective. Therefore, a **modal shift from road and air to rail** as the most environmentally friendly mode of transport is the only way forward.

> Modal shift must be supported by long-term strategies and policies supporting sustainable mobility growth, especially in the cities of emerging regions. Increasing funding problems only reinforce the importance of pricing mechanisms such as road charging, both for revenue generation and demand management.

² ITF Transport Outlook 2013

³ European Environment Agency (EEA), August 2011

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Adaptation to climate change

As it is widely accepted that the **consequences of climate change** are advancing, there is an already present need for the railway sector to develop and implement adaptation strategies and measures. Railways must be able to resist to extreme weather conditions, but also to recover from them in a short time and to be able to run in what are more extreme circumstances today. Products supplied by UNIFE members are currently designed to cope with very different climate conditions in various areas of the world. While UNIFE considers that no changes in the current regulatory framework are necessary, intensive work should be carried out on standardisation to adapt the European railway system to foreseeable climate changes.

Contributing to a healthier environement

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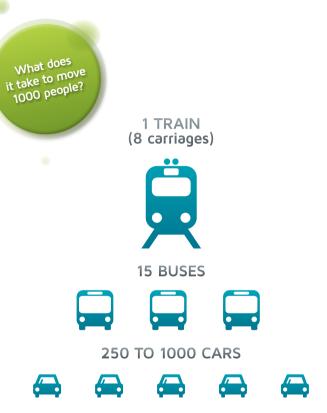
73. (Bia)

CO2 emissions are not the only factor that should be taken into account when thinking about sustainable transport: congestion, air pollution and quality of urban landscapes are key in determining the livability of a city. Due to its capacity and speed, rail transport is the ideal solution for long distance travel and congestion in urban areas.

Sustainable land use

Fast growth and urbanisation in Asia and Latin America are a key challer ge, but they also provide a tremendous opportunity for more sustainable and livable environments. Indeed, **urban rail networks consume very low urban space compared to** the capacity it offers. A rail line carries over 5 000 passengers per hour at street level in the case of light rail, and up to 60 000 passengers per hour on a single track in the case of regional metro. By comparison, a road lane can offer a maximum capacity of 1000 to 2500 passengers per lane per hour, and each car needs a parking place at the end of the journey⁴ Light rail systems are therefore acknowledged as an essential instrument to set up a new sustainable urban development paradigm. They enable better integration of transport in the urban landscape, with e.g. cutting-edge catenary less solutions that preserve city centres.

Rail Route 2050: the sustainable backbone of the Single European Transport Area, ERAC



Exhaust gas emissions

In Europe, 50% of railway lines are electrified, with around 80% of rail traffic currently powered by electricity; the remaining 20% of trains are powered by diesel, producing 4.5% of Europe's particulate emissions (PM10) and less than 2.5% of transport-related nitrogen oxides (NOx) in 2008⁵. Despite this good record, the rail industry is committed to **reducing noxious emissions**.

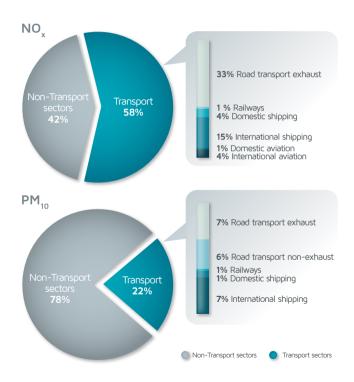


The CleanER-D project (2009-2013) aimed to develop, improve and integrate emissions reduction technologies for diesel locomotives and rail vehicles. Furthermore, it used innovative methods and hybrid solutions for the best possible

contribution to reductions in CO2 emissions. The CleanER-D consortium has developed recommendations to all involved stakeholders on how to boost emission reduction of rail diesel traction.

In 2012, UNIFE also engaged in the Platform for Surface Transport, along with other key stakeholders such as CER or UITP, and has actively promoted modal shift through this channel. The CleanER-D project (2009-2013)⁶ aimed to develop, improve and integrate emissions reduction technologies

Contribution of the transport sector to total emissions of the main air pollutants in 2009 (EEA-32)



⁵ CleanER-D references

⁶ www.cleaner-d.eu

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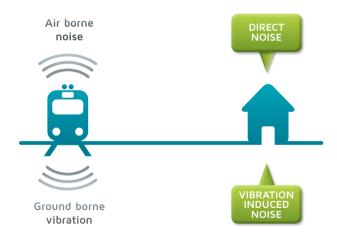
Chemical substances

At the European level, health and environmental risks caused by chemical substances are a high priority, and there is growing pressure to restrict the use of hazardous materials. Railways are not the focus of these concerns, but the sector is also committed to **strict compliance with European legislation**, including REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals).

UNIFE has a dedicated Chemical Risk Topical Group which aims to develop a common understanding and harmonised rules for the rail industry as well as providing support for railway system integrators and their suppliers in understanding their legal obligations. The **Railway Industry Substance List (RISL)** website⁷ was launched in 2011 to respond to this need, as well as the "UNIFE Material Declaration Template" developed in 2012. With this document, the reporting on hazardous substances is simplified for suppliers and the same format can be delivered for each system integrator.

Noise & vibration

While noise is an issue for all modes of transport, vibration is specific to rail and is an important environmental concern, affecting citizens nearby rail infrastructure.



⁷ www.unife-database.org

In recent years, the awareness among European politicians and policy-makers has grown regarding the negative health effects caused by **environmental noise**. Although train noise is much less intrusive than noise from the road and air sectors, the rail sector is committed to further reduce noise. One way to create the conditions for railway traffic to grow, without risking human health because of increased noise levels, is to control and limit the noise emission of railway vehicles.



For several areas of concern, **vibration** should be reduced to near or even below the threshold of perception. Although solutions are available for track in tunnels, tracks at grade are a much more extensive problem even for vibration-induced noise.



In 2011-2013, UNIFE participated in the RIVAS (Railway Induced Vibration Abatement Solutions) research project. Its aim was to reduce the environmental impact of ground-borne vibration and to provide solutions to vibration issues for surface lines. The project developed world leading technologies to ensure efficient control of exposure to vibration and vibration

induced noise from rail.



While a lot has been accomplished, research efforts should continue to reduce noise from individual sources and introduce technologies for active noise and vibration control. SHIFT²RAIL Transversal Group on Noise and Vibration aims to integrate both exterior and interior noise and vibration aspects in all relevant technology demonstrators of the Joint Technology Initiative. It also ensures that efforts from all partners are used in a coordinated and efficient way to deliver the noise and vibration targets. A system approach combining both low noise rolling stock low-noise infrastructure will be followed to ensure the competitiveness of a greener European railway system.

Optimising performance over the product life cycle

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One of the main concerns for the European rail industry is the increasing scarcity of natural resources. The necessity to communicate on the ecological footprint of materials is gaining momentum for both customers and end users, and current and future industrial processes must take into account recycling and recoverability aspects.

UNIFE has long experience in dealing with more sustainable procurement, as can be seen with the PROSPER project (Procedures for Rolling Stock Procurement with Environmental Requirements – phases I and II), which aimed at reaching a commonly agreed approach for handling environmental aspects at procurement level within the whole rail sector.

Product Category Rules

Due to a growing customer demand for information on the environmental performance of railway vehicles, Environmental Product Declarations (EPDs) are increasingly prepared by UNIFE members. EPDs are voluntarily developed information that provide quality-assured and comparable information regarding the environmental performance of products in accordance with the ISO 14025 standard.

The UNIFE Life Cycle Assessment Topical Group has developed the Product Category Rules (PCR) for rail rolling stock, a **standardised method to apply environmental life-cycle assessments** in a transparent and reliable way. The PCR defines common and harmonised calculation rules for a specific product category to ensure that similar procedures are used when preparing an EPD. UNIFE first issued PCR for rail rolling stock in 2009; the document was then updated taking into account new approaches like the Recyclability and Recoverability Calculation Method – Railway Rolling Stock, and the Railway Industry Substance List.

Recyclability & Recoverability Calculation Method

The end of life treatment of products and reduction of waste in general are key priorities on the environmental agenda within the European Union. Recyclability means that used materials are re-used into new products to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials and reduce energy usage.

The railway industry needed a common approach to ensure efficient recycling of the rolling stock and equipment as well as a common basis for calculating and reporting the recyclability and recoverability rates for rail products. In 2009, UNIFE therefore launched an expert team to develop **a common calculation method for the specific needs of the railway industry**. This method is based on the terminology of the automotive sector (automotive standard ISO 22628), but improved for railway components, and aims to encourage suppliers to design railway products in a recycling friendly way. This method is recommended to be used for new designs but can optionally be used for existing designs if data on materials is available. The method was finalised in March 2013.

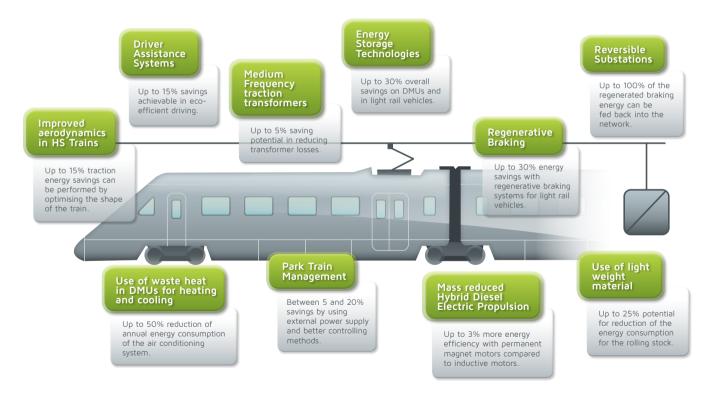


Increasing & measuring energy efficiency

Significant reductions in emissions due to transport, and therefore in energy consumption, are being demanded by governments and policy-makers, as well as by society. In Europe, over 50% of railway lines are electrified and renewables went from 12% of electricity production mix in 1990 to 21% in 2010, thus providing a cleaner and more reliable energy supply. Further gains in energy efficiency will facilitate the improvement of the railways' excellent environmental balance by cutting CO2 emissions, but also reducing energy costs, making train travel more affordable and thus promoting the modal shift to rail.

A holistic approach

Energy efficiency gains can be made at multiple levels in a train:



The industry has not only developed significant technology improvements during the last 20 years, but also achieved better energy efficiency along the whole system – trains, infrastructure, operation and unproductive time like parking modes.

The RAILENERGY project (2006-2010)⁸



aimed to cut energy consumption in the railway system and provided input for the joint UIC/ UNIFE Technical Recommendation "Specification and Verification of energy consumption for railway rolling stock", which was published as a CEN/CENELEC Technical Specification early 2013. Based on the Technical Specification, evaluation of energy savings for different service types shows that in 2010, an estimated 20% energy reduction has already been obtained and even the least of improvements shows more than 10% savings compared to 1990 vehicles. Further energy efficiency progress in rolling stock could be gained via advanced technologies investigated in R&D projects lead by the industry.

Advanced energy management in the railway system

Research also focuses on energy management systems in order to reduce overall consumption when operating vehicles on a given infrastructure.

The **OSIRIS** (Optimal Strategies to Innovate and Reduce energy consumption In urban rail Systems) project⁹ aims at developing a strategy to reduce energy consumption in an urban context by implementing technological and operational solutions, while testing and assessing their individual and combined benefits in real case scenarios. A series of standardised duty cycles and key performance indicators for urban rail systems that allow for direct performance comparisons will be defined. On 28 October 2013, the OSIRIS consortium participated in the joint UNIFE/UIC Workshop 'TecRec100_001 - A powerful tool for procuring energy efficient rolling stock'. The event disseminated the usage of the Technical Recommendation among EU energy managers, rolling stock manufacturers and procurement managers. OSIRIS used this occasion to present its plan to prepare a similar document dedicated to public rail transportation.

8 www.railenergy.org; www.railenergy.eu

9 www.osirisrail.eu

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The MERLIN (Management of Energy for smarter RaiLway systems in Europe: an INtegrated optimisation approach) project¹⁰ is investigating and demonstrating the viability of an

integrated management system to achieve a more sustainable energy usage in European electric mainline railway systems. MERLIN will provide an integrated optimisation approach towards a cost-effective intelligent management of energy and resources, and will also deliver the interface protocol and architecture for energy management systems in railways.

New materials for reduced energy consumption

Energy efficiency can be aimed through the materials that are used for the construction of rolling stock. Lighter materials can indeed consume less energy and help reduce the emissions of rail transport.



The overall objective of the **REFRESCO** (towards a REgulatory FRamework for the usE of Structural new materials in railway passenger and freight CarbOdyshells) project is to set the framework for the

implementation of new materials in the railway sector through the evolution of certification processes for rolling stock. SHIFT²RAIL

Energy is one of the key concerns of the SHIFT²RAIL Joint Technology Initiative. SHIFT²RAIL has identified a Key Performance Indicator on reduction in energy consumption to promote energy savings in a holistic approach of the railway system. The SHIFT²RAIL Transverse Group on Energy aims at integrating energy efficiency topics in Innovation Programmes and at providing technical support to technology demonstrators. Energy related technology developments will take place in all Innovation Programmes, covering many innovative solutions such as propulsion components, lightweight car bodies and low resistance running gears. Improved traffic management systems that reduce unintended stops on high-traffic lines and driver assistance systems will also significantly contribute to energy savings. New infrastructures and intelligent maintenance of tracks also have a strong potential to curb energy consumption.

10 www.merlin-rail.eu

Conclusion

To achieve the ambitious objective of a 60% reduction in CO2 emissions in the transport sector by 2050 set out in the Transport White Paper, transport has to use less and cleaner energy and reduce its negative impact on the environment and key natural assets.

The railway sector can significantly contribute to this effort through cutting-edge lowcarbon solutions that tackle climate change and urbanisation-related challenges.

Further progress in emissions reduction, increases in energy efficiency and material recyclability, or reducing noise and vibrations, will be made via advanced technologies emerging from R&D projects lead by the industry. In that respect, the European Joint Technology initiative SHIFT²RAIL will significantly contribute to increasing rail environmental performance and resilience to climate change.

UNIFE's messages

Rail transport already provides sustainable and lowcarbon solutions: CO2 emissions, energy efficiency, land use or recyclability all are key assets of rail-based solutions.

Policies must be right in order to guarantee the effective rollout of sustainable rail solutions, and intensified research & innovation efforts are needed to scale up cleaner and more efficient technologies.

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Sustainable transport must play a leading role in future European and international climate and energy agreements.



UNIFE represents the European Rail Industry in Brussels since 1992. The Association gathers around 80 of Europe's leading large and medium-sized rail supply companies active in the design, manufacture, maintenance and refurbishment of rail transport systems, subsystems and related equipment. A further one thousand suppliers of railway equipment partake in UNIFE activities through 15 national rail industry associations. UNIFE members have an 80% market share in Europe and supply more than 50% of the worldwide production of rail equipment and services.

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