



2022 GLOBAL RAIL SUSTAINABILITY REPORT


INTERNATIONAL UNION
OF RAILWAYS



The UIC supports the Sustainable Development Goals

Warning

No part of this publication may be copied, reproduced or distributed by any means whatsoever, including electronic, except for private and individual use, without the express permission of the International Union of Railways (UIC). The same applies for translation, adaptation or transformation, arrangement or reproduction by any method or procedure whatsoever. The sole exceptions - noting the author's name and the source - are "analyses and brief quotations justified by the critical, argumentative, educational, scientific or informative nature of the publication into which they are incorporated" (Articles L 122-4 and L122-5 of the French Intellectual Property Code).

FOREWORD

In 2022, the world's human population passed the 8 billion mark. While this milestone is remarkable, this reminds us that we need to continue to accelerate our efforts to live within our planet's means and keep the global temperature increase below 1.5oC. For transport, this means a system change, moving away from carbon intensive modes of transport like air travel and individual motorised transport, towards decarbonised options such as walking and cycling, combined with low-carbon solutions like public and rail freight transport.

Transport currently accounts for approximately a quarter of all greenhouse gas emissions –the sector with the second highest emissions after energy. This is why ensuring that rail becomes the backbone of transport systems is at the core of UIC's aims. With the goal of building collaborative partnerships, the UIC Sustainability Platform provides a trusted platform for rail companies around the world to connect and share practical solutions to overcome the sustainability challenges for railways.

This report highlights the impressive range of ways that railways and rail travel is contributing to a more sustainable future, from dramatic improvements to air quality and energy efficiency, to protecting wildlife and improving gender balance in the workforce.

Transport is key to fostering human connection. Now more than ever, the global transport community needs to make a concerted effort to deliver meaningful, systemic change that promotes social, economic, and environmental development and will allow future generations to live in prosperity and in harmony with nature.

François DAVENNE
Director General
International Union of
Railways (UIC)





PREFACE

The 2022 Global Rail Sustainability Report is the first document of its kind produced by UIC. It shows the effort, results, performance and perspectives of the rail community towards the aim of fulfilling the Sustainable Development Goals (SDGs) set by the United Nations (UN) for the Agenda 2030 and sustainable mobility more broadly.

This report is the synthesis of certain global and regional stories which provide an overview of how railways are supporting urgently needed climate action within the transport sector, in order to deliver the Paris Agreement's climate goals. Through collaboration with the UIC Sustainability Platform members and key partnerships, the report shows the progress that the rail sector has made in supporting the United Nations Sustainable Development Goals, told through case studies and insightful analysis, which are all backed by evidence collected by UIC and its partners. Finally, it constitutes an open invitation for all rail companies across the globe to share data and help establish the contribution of rail.

CONTENTS

RAIL SUSTAINABILITY 2022 AT A GLANCE ...	4	THE ENVIRONMENT AND POLLUTION	29
REPORT METHODOLOGY	6	Biodiversity protection and enhancement	29
The Rail Sustainability index	6	Air quality	30
UIC Rail information system and analyses (Railisa)	7	Being a good neighbour: quieter rail	32
The traction energy and emissions database	8	ADAPTING TO CLIMATE CHANGE AND WEATHER RESILIENCE	34
Case studies: the International Sustainable Rail Awards (ISRA) 2022	8	THE RAILWAY AS A DIVERSE AND INCLUSIVE WORKPLACE	35
RAIL AS THE BACKBONE OF SUSTAINABLE MOBILITY	10	INCLUSIVE TRAVEL, STATIONS AND INITIATIVES	37
The impact of the pandemic on rail	12	RAIL EMPLOYMENT AND ECONOMIC GROWTH	40
A seamlessly connected system	13	Green jobs and decent work	40
RAIL DEVELOPMENT AND ACCESS TO PUBLIC TRANSPORT	15	Sustainable finance and economic growth	41
Rail and climate policy	15	PROMOTING PEACE AND CRISIS SUPPORT	43
Regional policies and strategies	16	Rail's response to the Russian invasion of Ukraine	43
CO₂ EMISSIONS, DECARBONISATION AND CLIMATE CHANGE MITIGATION	20	CONCLUDING MESSAGE FROM THE UIC SUSTAINABILITY PLATFORM CHAIR	44
ELECTRIFICATION, ENERGY SAVING AND RENEWABLE ENERGY	23	MEET THE AUTHORS	45
SUSTAINABLE SUPPLY CHAINS	26	THE UIC SUSTAINABILITY PLATFORM	46
Circularity & sustainable procurement	26		
Sustainability governance & reporting	28		

3 GOOD HEALTH AND WELL-BEING



Target 3.9

By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

THE UIC ENERGY AND CO₂ TRACTION DATABASE RECORDED FROM 2005 TO 2021



5 GENDER EQUALITY



Target 5.1

End all forms of discrimination against all women and girls everywhere

Target 5.C

Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels

Of the RSi reporting companies:



7 AFFORDABLE AND CLEAN ENERGY



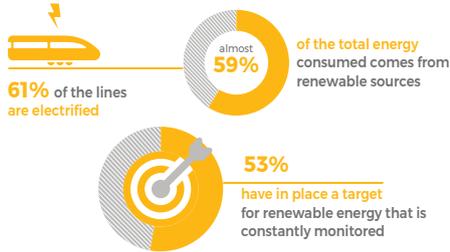
Target 7.2

By 2030, increase substantially the share of renewable energy in the global energy mix

Target 7.3

By 2030, double the global rate of improvement in energy efficiency

Of the RSi reporting companies:



8 DECENT WORK AND ECONOMIC GROWTH



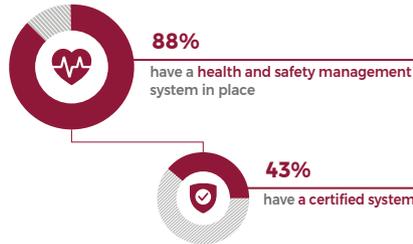
Target 8.5

By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

Target 8.8

Protect labor rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment

Of the RSi reporting companies:



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



Target 9.1

Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

Target 9.4

By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

Of the RSi reporting companies:



RAIL SUSTAINABILITY 2022 AT A GLANCE

RAIL SUPPORTS THE SUSTAINABLE DEVELOPMENT GOALS



Target 11.2
By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

Target 11.6
By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

23 UIC MEMBERS WORKING TOGETHER

IN PASSAGE
Passenger Accessibility Solutions Support and Action Group of Experts



Target 12.2
By 2030, achieve the sustainable management and efficient use of natural resources

Target 12.4
By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment

Target 12.5
By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

Target 12.6
Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle

Of the RSI reporting companies:



Target 13.1
Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Target 13.2
Integrate climate change measures into national policies, strategies and planning

Of the RSI reporting companies:



Target 15.5
Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

Target 15.a
Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems



Target 16.1
Significantly reduce all forms of violence and related death rates everywhere



Rail has helped to keep the Ukraine connected, not only to continue the movement of goods and supplies, but also to safely evacuate refugees. Between May and September 2022, roughly 15 million tons of goods were exported from Ukraine via the solidarity lanes.



REPORT METHODOLOGY

The report is a synthesis of the most recent data from a range of UIC databases, including the UIC RAIL Information System and Analyses (RAILISA), the Rail Sustainability index (RSi), the Traction Energy and Emissions Database (formerly the Environment Strategy Reporting System, ESRS) and the UIC International Sustainable Rail Awards. The document is also supported by literature, data and reports from several international organisations,

including the United Nations (UN), the International Energy Agency (IEA), the European Commission, the European Union Agency for Railways (ERA), and the Community of European Railways and Infrastructure Companies (CER). It should be noted that the data sources come predominantly from the global North and from Europe, often due to a lack of data from other regions of the world, although the global situation is given wherever available.

THE RAIL SUSTAINABILITY INDEX

The [UIC Rail Sustainability index \(RSi\)](#) was launched in 2022. The RSi is a benchmarking tool that measures the sustainability performance of rail using the framework of the United Nations Sustainable Development Goals (UN SDGs).



The RSi is made up of a set of Key Performance Indicators (KPIs) which provide UIC members with a unique rating, presented as a dashboard, to keep track of progress supporting a range of these SDGs. A materiality assessment was carried out by a working group against all 17 goals to establish a shortlist of those most directly aligned to rail activities, and where a contribution can be easily demonstrated by the members. The following were deemed most relevant:



RSi Methodology

The index is made up from a set of 21 KPIs and 51 variables (either collected or calculated and consisting of both quantitative figures and qualitative questions) related to the 7 goals. A working group, made up of sustainability professionals from UIC members, set a weighting for each of the SDGs based on a prioritisation exercise.

The scoring uses a benchmarking capability to compare average railway performance which is cross checked with external desktop data research. Members can see their performance for each SDG compared to the average scores of all the other participating members and therefore compare against their peers globally.

In total, 34 companies took part in the first data collection cycle of the RSi:

- 15 companies are infrastructure managers, passenger operators and freight operators combined
- 6 companies are infrastructure managers only
- 6 companies are passenger operators only
- 4 companies are freight operators only
- 3 companies are both passenger and freight operators

The RSi data was collected from three different world regions, with 32 European participants, 2 Asian companies, and 1 North American business taking part. For the first cycle of data collection, members were asked to enter figures from the past three years (2019-2021) so that trends and progress could be observed. UIC members have exclusive access to this system at no extra charge, and participation is voluntary. As a whole, UIC currently has 200 members across 95 countries and is continuing to increase engagement by promoting the tool.

For this report, the combined total and average scores from the RSi data have been used.

UIC RAIL INFORMATION SYSTEM AND ANALYSES (RAILISA)

[Railisa](#) is an online UIC tool allowing members to visualise and download the data provided by more than 100 railway companies worldwide. Some of the indicators reported in the tool have been documented since 1995 with continuous updates. Railisa includes factors such as infrastructure size, traffic activity and electrification levels.



THE TRACTION ENERGY AND EMISSIONS DATABASE

The Traction Energy and Emissions Database (formerly the Environment Strategy Reporting System, ESRS) was developed to provide UIC members with an easy monitoring, reporting and benchmarking tool according to their energy consumption and emissions against collectively agreed upon targets. It was originally created to track European railway collective 2030 emissions targets.



The database provides an overall picture of energy consumption and emissions for the railway market. It compiles the overall train energy consumption for traction, including the energy used for auxiliary

systems, heating, ventilation, and air conditioning (HVAC). UIC members enter their own energy data as well as their calculated emissions into the common database. If no emission figures are provided, UIC determines emission values based on energy consumption levels, using standard emission factors. Members also report regarding their green energy purchase agreements and their own production of green energy if applicable.

The data predominately comes from European UIC members and therefore provides an adequate overview of the European railways' reduction targets. In 2020, [Eurostat](#) (the official statistical office of the EU) data coverage was more than 97% of passenger traffic (passenger-kilometres) and approximately 54% of freight traffic (ton-kilometres). The 2022 data collection outputs used for this report represent 26 European companies and 2 from other regions (2022 being the first year that the data collection was promoted to non-European members).

CASE STUDIES: THE INTERNATIONAL SUSTAINABLE RAIL AWARDS (ISRA) 2022

The [UIC International Sustainable Rail Awards](#) celebrate innovation in transport projects that promote sustainability, split into three core pillars: social (people), environmental (planet) and economic (prosperity).¹



The recipients were chosen by a jury of industry experts following a scored shortlisting and interview/presentations round. On 1 June 2022, for the first time, a gala ceremony was held in Berlin, where awards were given to the most inspiring projects and initiatives.

¹ The UIC International Sustainable Railway Awards 2022 - AwardStage. (2022). <https://sustainablerailway.awardstage.com/>



The winning projects in each category were:

People

- Best Contribution to the COVID-19 Emergency: [Société Nationale des Chemins de fer Français – Medical TGVs Trains](#)
- Best diversity and inclusion initiative: [Network Rail & Shelter](#)

Planet

- Best circular economy project: [Nederlandse Spoorwegen – Circular Modernisation](#)
- Best green corridor: [Network Rail – Biodiversity Monitoring](#)
- Best use of zero-carbon technology: [Indian Railways - Bina Solar Plants](#)

Prosperity

- Best multimodal shift: [Rete Ferroviaria Italiana – Stationland](#)
- Best climate change project: [Indian Railways – Electrification](#)
- Rebuilding confidence in rail: [Network Rail – King's Cross Station](#)



RAIL AS THE BACKBONE OF SUSTAINABLE MOBILITY

The IPCC report published in April 2022, “[Climate Change 2022: Mitigation of Climate Change](#)”, acknowledges that there is a need for systemic change in the way we move, and that “*interventions that support a modal shift away from private motor vehicles towards walking, cycling, and low emissions shared, or public transportation*” constitute a fundamental step to achieving the climate goals set by the Paris Agreement.²

The 2022 World Bank report “[The Role of Rail in Decarbonising Transport in Developing Countries](#)”³ also identifies the benefits of a shift to rail investments in the global south. Furthermore, the UN states that reliable and sustainable transport systems have a positive impact towards achieving the SDGs.⁴ Rail has an advantage due to its energy efficiency, but also its other notable environmental benefits (e.g., greenhouse gas emissions, air pollution, noise and land take).⁵



² Lwasa, S., K.C. Seto, X. Bai, H. Blanco, K.R. Gurney, Ş. Kılıç, O. Lucon, J. Murakami, J. Pan, A. Sharifi, Y. Yamagata, 2022: Urban systems and other settlements. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.010

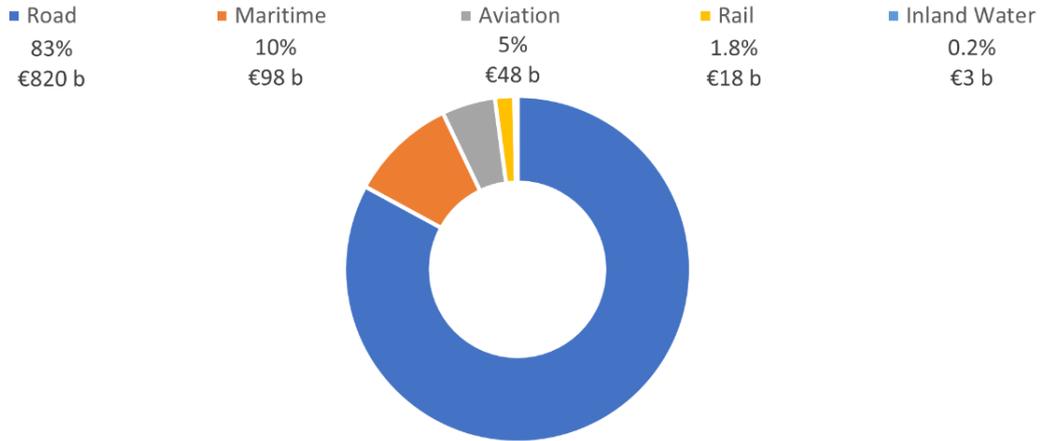
³ Lawrence, Martha; Bullock, Richard. 2022. *The Role of Rail in Decarbonizing Transport in Developing Countries. Mobility and Transport Connectivity Series*. Washington, DC : World Bank. © World Bank. <https://openknowledge.worldbank.org/handle/10986/38214>

License: CC BY 3.0 IGO

⁴ United Nations. Sustainable transport, sustainable development. Interagency report for second Global Sustainable Transport Conference. 2021.

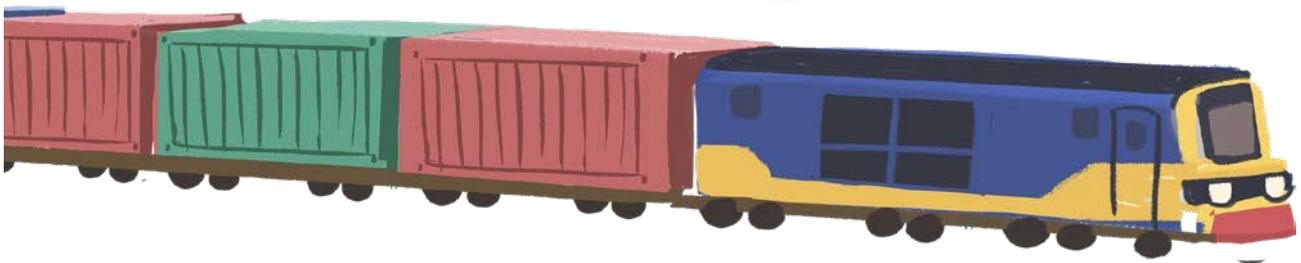
⁵ European Commission, Directorate-General for Mobility and Transport, Wijngaarden, L., Schroten, A., Essen, H., et al., *Sustainable transport infrastructure charging and internalisation of transport externalities : executive summary*, Publications Office, 2019, <https://data.europa.eu/doi/10.2832/246834>

EU28 External costs of transport share



Data Source: European Commission (2019)

Railways only account for 1.8% of the transport sector's external costs within the EU28, where the total externalities have an estimated value of €987 billion. These costs mainly include environmental externalities, accidents, and congestion.⁶



⁶ European Union Agency for Railways (ERA) (2017) *FOSTERING THE RAILWAY SECTOR THROUGH THE EUROPEAN GREEN DEAL*. Available at: https://www.era.europa.eu/content/report-fostering-railway-sector-through-european-green-deal_en.

THE IMPACT OF THE PANDEMIC ON RAIL

The rail sector, and public transport more broadly has been significantly impacted by the COVID-19 pandemic. Since March 2020, UIC and its members have been actively combating the impact of the pandemic, promoting adequate measures for the safety of their employees and customers, as described in the [Management of Covid-19](#) document written after the [UIC Covid-19 Taskforce](#) was formed.

The group set out to aid members in exchanging information to find solutions to respond to the COVID-19 crisis, to be implemented in the railway sector, providing concrete measures and guidelines, without overstepping legislation in each member country.⁷ Several railway companies provided concrete aid and tangible solutions to recover from the pandemic, as shown by the SNCF initiatives in France.

Best Contribution to the COVID-19 Emergency - SNCF – Medical TGV Trains

After COVID-19 forced France into lockdown in 2020, rail transport was reduced to a minimum, with less than 5% of the normal high-speed train services running. Later, SNCF was asked to provide transport for patients suffering from COVID-19 to relieve pressure on the hospitals in the Grand Est and Ile-de France regions, which were the hardest hit by the pandemic, thus “Operation Chardon” was born. TGV INOUI also donated 3,000 catering products and the Intercités gave 3,150 quilts from the night trains to help the homeless. This initiative was a “first” in the history of the French rail sector. Moreover, SNCF chartered 10 medical TGVs to carry a total of 202 emergency patients.



⁷ International Union of Railways (UIC). (2022, September 2). COVID-19 –. UIC - International Union of Railways. <https://uic.org/covid-19/>

After the shock of the pandemic, the railway sector has worked hard to recover and to return to 2019 volume levels. Performance in 2021 and 2022 was an improvement compared to 2020, although most companies have not yet reached pre-pandemic standards.

From 2004 to 2019 passenger traffic had increased in most of the world regions, almost doubling in Asia, and growing by more than 20% in both Europe and America.

In 2020, compared to 2019, every world region experienced a decrease in passenger traffic, with a 38% shrink globally that included -49% in Europe, -35% in Asia, -63% in America, and -59% in Africa. All of the world regions are recovering from the shock, with several countries now being close to pre-pandemic levels.

Freight traffic in the past 15 years has been stable and the effects of the pandemic are not as visible as for passenger traffic,⁸ however, freight traffic was lower in 2021 than in 2020 for several operators. The [Rail Freight Forward](#) coalition highlights the need for a dramatic change for modal shift to rail for the transport of goods to 30% in Europe by 2030.

Multimodal Shift - RFI – StationLAND

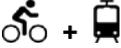
- The RFI Station Department has developed a GIS-based (geographic information system) platform called StationLAND. It is a web application to conduct analysis and studies for stations, especially from a transport, land-related and socioeconomic point of view. It is the most powerful tool available in Italy, and aims to develop transport and mobility analysis by studying and planning intermodal transport projects.
- RFI is transforming railway stations into real nodes of integrated and sustainable mobility. The goal is to strengthen connections between stations and the urban mobility system.
- StationLAND is at the heart of this process and is regarded as a tool to enable and implement this transformation.



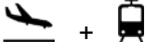
⁸ <https://uic.org/IMG/pdf/passenger-tonne-line-kilometers-timeseries-over-period-2004-2020.pdf>

A SEAMLESSLY CONNECTED SYSTEM

The future of sustainable mobility must inevitably be increasingly multimodal, finding the right mode, or modes, of transport for the right journey. Railway stations and terminals function as transport hubs and can form the backbone for all types of journeys in a seamless and connected way. 2022 was an important year in rail innovation to pioneer intermodal connectivity with notable examples, such as:

-  Encouraging walking and cycling is part of the [Walk-Cycle-Ride strategy](#) to promote active transport as a greener and more sustainable transport alternative for Singapore. Since 2018, approximately 200km of sheltered walkways have been added island wide as part of the Walk2Ride programme. Walks within 400m from all Mass Rapid Transit (MRT) stations and within 200m from bus interchanges, Light Rail Transit (LRT) stations, and selected bus stops with a high volume of commuters are now completely covered. By 2040, the aim is for all journeys to the nearest neighbourhood or commercial hub using the Walk-Cycle-Ride method to be completed in less than 20 minutes, and for 9 in 10 peak period journeys using Walk-Cycle-Ride to be completed in less than 45 minutes.⁹
-  The National Railway Company of Belgium's [train-bike strategy](#), aims to increase the

overall capacity for bicycles on trains, to provide more secure bicycle parking, and ensure clearer signage and better information for travellers.¹⁰ This piece of legislation came about due to the harmonisation of an existing 2014 Belgian law on the rights and obligations of rail passengers, and a 2021 European Parliament and Council regulation on the rights and obligations of rail passengers, according to which, EU member states are to equip all train arrangements that include new or upgraded rolling stock, with a minimum of four spaces for bicycles.¹¹

-  An innovative partnership was launched in 2022 between Delta Airlines and European train operators. This new alliance offer is the [European Air + Rail programme](#), where passengers can purchase combined air and rail tickets. The service extends US access to the European cities which are currently not served by Delta, offering connecting flights at Brussels, Manchester, Rome and Zurich airports. Customers also have peace of mind that should disruptions occur, they are able to travel on the next available train or flight.¹²
-  The “Rolling Road” (or [ROLA](#)) combined transport approach has a positive impact on congestion and safety, since truck drivers are able to relax on-board the train. Estimates show that ROLA has saved more than 20,000 tonnes of CO₂ since the beginning of 2021.¹³

⁹ Land Transport Authority. (2021). *LTA | Getting Around*. https://www.lta.gov.sg/content/ltagov/en/getting_around.html

¹⁰ Bayer, V. (2021, December 9). *Avec sa stratégie vélo ambitieuse, la SNCB s'engage à offrir une capacité supplémentaire de qualité dans ses trains et ses gares*. SNCB. <https://press.sncb.be/avec-sa-strategie-velo-ambitieuse-la-sncb-sengage-a-offrir-une-capacite-supplementaire-de-qualite-dans-ses-trains-et-ses-gares>

¹¹ European Council. (2021, January 31). *Improved rail passenger rights adopted by Council* [Press release].

<https://www.consilium.europa.eu/en/press/press-releases/2021/01/25/improved-rail-passenger-rights-adopted-by-council/>

¹² *Delta's Air+Rail program connects customers to 20 more destinations in Europe*. (2022, October 11). Delta News Hub. <https://news.delta.com/deltas-airrail-program-connects-customers-20-more-destinations-europe>

¹³ Induportals Media Publishing. (2021, December 3). *ROLA BEATS LAST YEAR'S TRANSPORT VOLUMES*. Railway International. <https://www.railway-international.com/news/49502-rola-beats-last-year%E2%80%99s-transport-volumes>



RAIL DEVELOPMENT AND ACCESS TO PUBLIC TRANSPORT

As the benefits of rail and public transport in combating climate change become more well known, national and regional policy and strategies are increasingly being implemented to expand rail and public transport systems. Investments have been made and announced in several of the world's regions, in order to expand access to the public transport system, and increasingly include vulnerable communities and members of society. Expanding the rail network and providing an adequate sustainable and reliable service enables the rail sector to support SDG 11 Target 11.2 *“By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.”*



RAIL AND CLIMATE POLICY

To enhance rail services, it is essential to implement clear strategies and set targets. The Nationally Determined Contributions (NDCs) are a set of national plans to mitigate climate change and attain the objectives of the Paris Agreement. Only 18% of these include a specific target on reducing transport emissions, and according to [SLOCAT](#), of the 200+ NDC transport measures proposed, there is a strong bias towards passenger transport, which is included in 91% of the NDCs which identify specific transport modes. Furthermore, urban transport measures are mentioned in 74% of these NDCs, while high-speed rail strategies only make up 2%. While freight traffic contributes about 40% of the transport sector's CO₂ emissions, it is only mentioned in 29% of the NDCs that propose transport measures. An example of an NDC with clear modal shift targets is India, which has committed to increasing land transportation by rail from 36% to 45%, and decreasing transport on less efficient diesel operated road traffic.¹⁴

¹⁴ ITF. (2023). *How serious are countries about decarbonising transport?* International Transport Forum | NDC Tracker. <https://www.itf-oecd.org/ndc-tracker/en>

In the last year, 30 countries have updated their NDCs with 9 of them now including rail, mostly in terms of mitigative action. Some of these countries are:

- Egypt – promoting green finance (green bonds) for clean transport, expanding metro, monorail, and light rail as clean modes of transport for investment. It has also set specific transport emission targets.¹⁵
- Thailand – promoting a road-to-rail modal shift for both freight and passenger traffic, as part of the Environmentally Sustainable Transport System Plan.¹⁶
- UAE – promoting the increased use of public transport (the urban metro in Dubai, for example). Constructing new freight lines that will significantly reduce emissions thanks to a road to rail modal shift.¹⁷

REGIONAL POLICIES AND STRATEGIES

Europe

The European Union (EU) aims to achieve climate neutrality by 2050, and to be the first continent to do so. To achieve this goal, the [European Green Deal](#) calls for 75% of inland transport to shift from road towards cleaner options, and a 90% reduction in the transport sector's emissions by 2050 when compared to 1990.¹⁸ To this end, there will be an estimated €87.5 billion of investment in rail infrastructure.¹⁹

To promote the expansion of railways, the [European Sustainable and Smart Mobility Strategy](#) has stated that rail freight traffic needs to double, high-speed rail traffic should triple, and that the multimodal Trans-European Transport Network should be operational by 2050.²⁰ For these reasons, 2021 was declared the [European Year of Rail](#), with the aim of supporting and highlighting the railway as a sustainable, reliable, innovative, intermodal, and safe mode of transport.²¹

¹⁵ UNFCCC. (2022). *Egypt's First Updated Nationally Determined Contributions*.

<https://unfccc.int/sites/default/files/NDC/2022-07/Egypt%20Updated%20NDC.pdf.pdf>

¹⁶ UNFCCC. (2020). *Thailand's updated Nationally Determined Contribution*.

<https://unfccc.int/sites/default/files/NDC/2022-06/Thailand%20Updated%20NDC.pdf>

¹⁷ UNFCCC. (2020b). *Second Nationally Determined Contribution of the United Arab Emirates*. <https://unfccc.int/sites/default/files/NDC/2022-06/UAE%20Second%20NDC%20-%20UNFCCC%20Submission%20-%20English%20-%20FINAL.pdf>

¹⁸ European Commission. (2021). *Sustainable and Smart Mobility Strategy: Putting European transport on track for the future*.

<https://transport.ec.europa.eu/system/files/2021-04/2021-mobility-strategy-and-action-plan.pdf>

¹⁹ International Union of Railways (UIC). (2022). *Manifesto for the UIC centenary: Rail Solutions for a Better Future*.

https://uic.org/IMG/pdf/uic-manifesto_rail-solutions-for-a-better-future.pdf

²⁰ European Commission. (2020). *COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Sustainable and Smart Mobility Strategy – putting European transport on track for the future*. https://eur-lex.europa.eu/resource.html?uri=cellar:5e601657-3b06-11eb-b27b-01aa75ed71a1.0001.02/DOC_1&format=PDF

²¹ European Union Agency for Railways (ERA). (2022, November 25). *European Year of Rail 2021* [Press release].

https://www.era.europa.eu/content/european-year-rail-2021_en

The [Rail Freight Forward](#) coalition highlights the need for a dramatic change for modal shift to rail for the transport of goods to 30% in Europe by 2030.

One example of investment in the rail sector in Europe is the expansion and implementation of night routes, operated by ÖBB with the “Nightjet” or “EuroNight” trains, in collaboration with several other European railway companies.²²

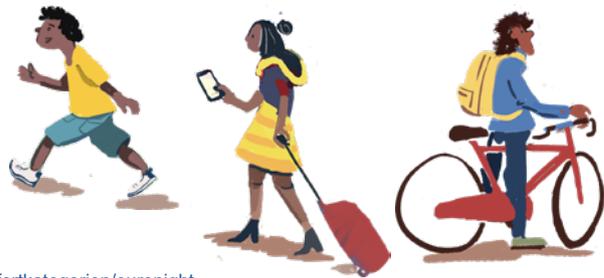


Source: ÖBB (2023)²³

North America

The United States of America has underlined the importance of achieving net-zero emissions by 2050 with the [2021 Long Term Strategy \(LTS\)](#), in order to improve their citizens’ quality of life. In this, it acknowledged the importance of rail transport and how network development is a crucial means of reducing emissions and connecting communities in an accessible way.²⁴ Moreover, the Infrastructure Investment and Jobs Act will provide \$66 billion of funding for corridor development, track upgrades, and safety improvements.²⁵

In 2022, AMTRAK announced their commitment to reaching [net zero emissions by 2045](#) and Canada released the High Frequency Rail project, aiming to invest in new infrastructure for passenger rail development. [VIA Rail](#), who also unveiled their 5 year sustainability plan, is a partner of this project, which represents one of the largest infrastructure projects in the history of the country, with more than 1000km of track being built for passenger services to connect major cities in the country such as Toronto, Ottawa, Montreal, and Québec City.



²² ÖBB. (2023). *EuroNight Trains*. ÖBB Nightjet. <https://www.nightjet.com/en/komfortkategorien/euronight>

²³ ÖBB. (2023). *EuroNight Trains*. ÖBB Nightjet Destinations <https://www.nightjet.com/en/reiseziele>

²⁴ United States Department of State and United States Executive Office of the President (2021) *The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050*. Available at: <https://www.whitehouse.gov/wp-content/uploads/2021/10/US-Long-Term-Strategy.pdf>

²⁵ International Union of Railways (UIC). (2022). *Manifesto for the UIC centenary: Rail Solutions for a Better Future*. https://uic.org/IMG/pdf/uic-manifesto_rail-solutions-for-a-better-future.pdf

Asia & Oceania

The Council for Decarbonising Transport in Asia is forecasting that rail will become the main form of domestic non-urban and intercity passenger transport in the future, while also becoming 100% electrified, and transporting most of the continent's freight.²⁶ By 2030 Asia will have half of the global population, 40% of the world's GDP, 30% of global transport emissions, and almost 60% of the worldwide road crash fatalities.²⁷ These figures demonstrate the potential for rail development in the region.



Source: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (2021)²⁸

One example of investment in the rail sector in Asia is China's expansion of the high-speed rail network, although it is already the largest in the world, plans are underway for it to reach 50,000km by 2025.²⁹



²⁶ Council for Decarbonising Transport in Asia (2022) *The Path to Zero: A Vision for Decarbonised Transport in Asia – Overcoming Blind Spots and Enabling Change*. Available at: https://changing-transport.org/wp-content/uploads/2022/04_NDC-TIA-Council_The-Path-to-Zero.pdf

²⁷ UNCRD (2021) "Aichi 2030 Declaration on Environmentally Sustainable Transport - Making Transport in Asia Sustainable (2021-2030): Sustainable Transport Goals for Achieving Universally Accessible, Safe, Affordable, Efficient, Resilient, Clean and Low-carbon Passenger and Freight Transport in Asia." Available at: <https://www.uncrd.or.jp/content/documents/8378Aichi%202030%20Declaration-20%20Oct%202021-ADOPTED.pdf>

²⁸ Source: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (2022) *The Development of High-Speed Rail in China* https://transition-china.org/wp-content/uploads/2022/06/20220621_HSR-Study-English-Final.pdf

²⁹ Wang, O. (2022, January 21). China plans expansion of high-speed railway equal to combined length of next 5 largest countries by network... *South China Morning Post*. <https://www.scmp.com/economy/china-economy/article/3163957/china-plans-expansion-high-speed-rail-network-equal-combined>

Africa

The continent is making efforts in different areas to build rail infrastructure to ensure a reliable, efficient and sustainable service for the future. To underpin this, UIC Africa members signed a [Sustainability Pledge](#) in 2021 on behalf of the African railway community. With this pledge, the African railways commit to attaining 25% of the market by 2050, carbon neutrality by 2050, and making an immediate effort to support the rail workforce and improve their well-being.³⁰ Additionally, the “Agenda 2063” is another important indicator for how rail can help build a sustainable future, where a well-integrated African high-speed rail system is the backbone of sustainable transport.³¹



An example of consistent investment in the rail sector on the African continent is the high-speed rail in Egypt, with an ambitious plan to build 2,000km of high-speed rail network, consisting of three main lines, connecting 60 stations throughout the country and enabling around 500 million journeys per year.^{32,33}



Source: Deutsche Bahn (2023)³⁴

³⁰ International Union of Railways (UIC). (2021). *SUSTAINABLE RAILWAYS AFRICA : Sustainability Pledge*.

<https://uic.org/IMG/pdf/sustainable-railways-africa-pledge.pdf>

³¹ International Union of Railways (UIC). (2022). *Manifesto for the UIC centenary: Rail Solutions for a Better Future*.

https://uic.org/IMG/pdf/uic-manifesto_rail-solutions-for-a-better-future.pdf

³² May, T. (2022, November 9). DB to Operate Egypt's First High-Speed Rail Network. *Railway-News*.

<https://railway-news.com/db-to-operate-egypts-first-high-speed-rail-network/>

³³ Railvolution. (2022b, May 28). Contract For A 2,000 km High-Speed Rail System In Egypt Finalised. *Railvolution*.

<https://www.railvolution.net/news/contract-for-a-2-000-km-high-speed-rail-system-in-egypt-finalised>

³⁴ “Suez Canal on Rails” – A New Era for Passenger and Freight Transport in Egypt. (2023, February 7). Deutsche Bahn E.C.O.

<https://db-eco.com/en/suez-canal-on-rails-a-new-era-for-passenger-and-freight-transport-in-egypt/>

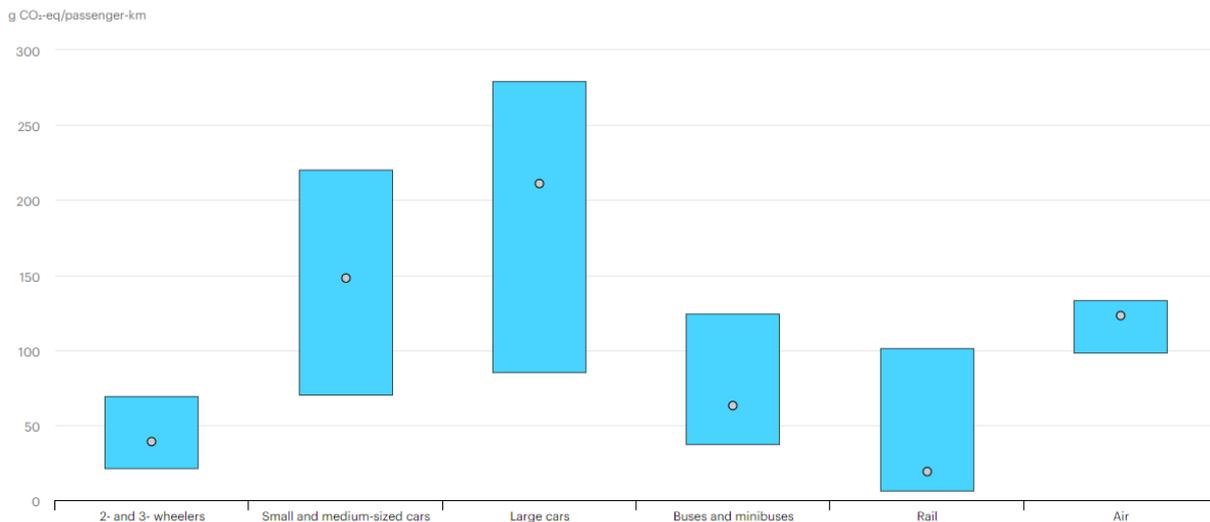


CO₂ EMISSIONS, DECARBONISATION AND CLIMATE CHANGE MITIGATION

Rail will play a crucial role in realising a decarbonised future by 2050. Rail is energy efficient and low carbon by design due to the low adhesion between train and track, when compared to other motorised modes of transport.³⁵

In 2022, IEA reported that the global average rail greenhouse gas (well to wheel) intensity was 19g CO₂-eq/passenger-km in contrast to 211g for large cars.

Well-to-wheel (wake/wing) GHG intensity of motorised passenger transport modes



Source: IEA (2022)³⁶

³⁵ Lawrence, Martha, and Richard Bullock. 2022. The Role of Rail in Decarbonizing Transport in Developing Countries. Mobility and Transport Connectivity Series. © World Bank

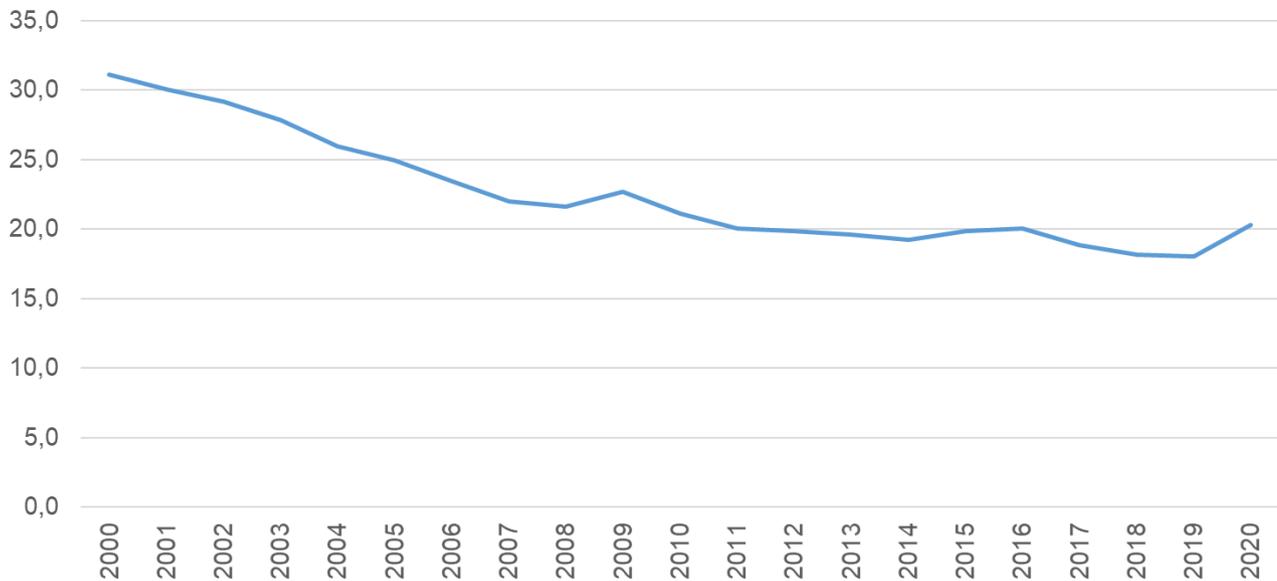
³⁶ IEA (2022), Rail, IEA, Paris <https://www.iea.org/reports/rail>, License: CC BY 4.0

In order to be on track for achieving the Paris Agreement objectives, IEA projections require a more than 40% increase in the railways' share of mobility by 2030, namely through a shift from aviation and road transport.³⁷ This shift, along with the continued efforts from rail to decarbonise operations, would potentially save a cumulative 460Mt of CO₂ emissions by 2050, as estimated by the IEA World Energy Outlook.

Rail's global energy mix is currently equally split between electricity and diesel, though electricity is projected to account for 65% of the share by 2030. Currently, two thirds of the total energy consumption for freight comes from diesel, but this must also be reduced to 40% by 2030.

Over the last 20 years, rail has continually improved its performance to support action on SDG13, reducing its carbon intensity (indicator 13.2.2 the "Total greenhouse gas emissions per year").

World rail specific CO2 emissions (gCO2/TU)



Source: IEA - Greenhouse Gas Emissions from Energy; OECD; UIC

*TU (Transport Unit) = passenger-km + ton-km

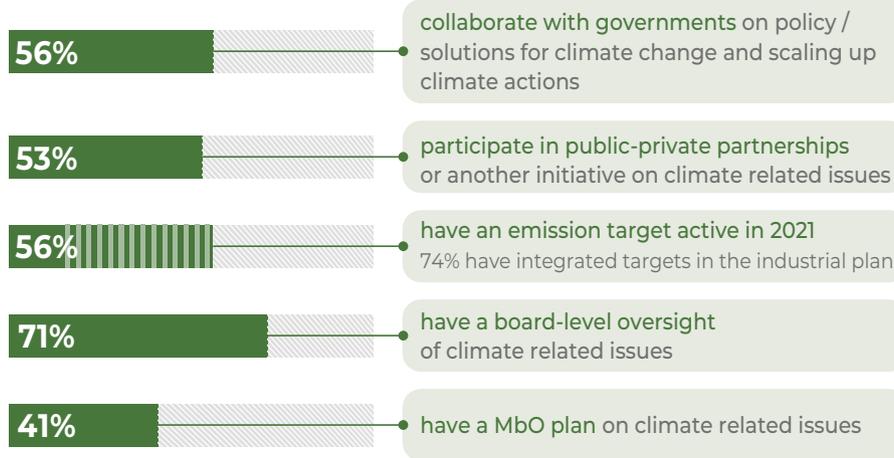
The consistent focus in mitigating climate change is shown by its work in achieving SDG 13 Target 13.2 to "integrate climate change measures into national policies, strategies and planning".

³⁷ [net zero emissions \(NZE\) scenario for 2050](#), IEA

UIC members have publicly declared their intention to decarbonise and contribute to the SDGs by signing the [UIC Railway Climate Declaration](#). In 2022, two new members, Sydney Trains and the Korean National Railways, joined and also declared their commitment to supporting the Paris Agreement objectives by decarbonising operations by 2050 and delivering on the SDGs.



Of the RSi reporting companies:



MbO encompasses a strategy of targets set for the top management with monetary rewards if said targets are achieved. These targets used to only be related to economic achievements, but now also include environmental and emissions related objectives.

International Sustainable Railway Award - Indian Railways – Electrification

In 2018, the Ministry of Railways started a project to electrify all of the country’s broad-gauge lines. In order to implement the “Mission 100% electrification” by 2024, major challenges had to be overcome. In 2020-2021, 6,000km of the total network was electrified including 75% of the broad-gauge lines and high-density network routes (60% of total IR freight traffic), with speed and line capacity increasing by 20%. IR also aims to reduce CO₂ emissions by 24% by 2027 – 2028.



ELECTRIFICATION, ENERGY SAVING AND RENEWABLE ENERGY

Target 7.2

By 2030, increase substantially the share of renewable energy in the global energy mix

Target 7.3

By 2030, double the global rate of improvement in energy efficiency

Percentage (%) of electrified lines per world region		
	2011	2020
EU 27	53.31	57.15
Russia	50.72	51.73
Other Europe	40.59	45.81
Asia and Oceania	30.91	43.51
Africa	14.54	14.97
Americas	0.81	0.79
World	26.21	31.65

Source: RAILISA

Of the RSi reporting companies:



61% of the lines are electrified



almost 59% of the total energy consumed comes from renewable sources



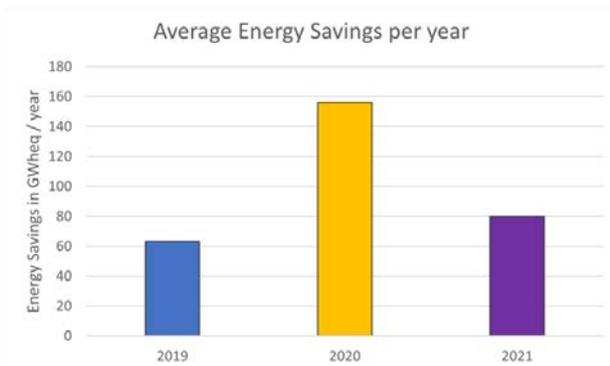
53%

have in place a target for renewable energy that is constantly monitored

The UIC RSi highlights the energy saving efforts of participating members, taking the projects and initiatives implemented for better energy performance into account. These measures can vary from smart driving strategies to purchasing energy efficient locomotives, as well as smart lighting and air conditioning systems.



Energy saving drastically increased between 2019 to 2020. This tapered off in 2021 but was still an improvement over 2019, supporting the hypothesis of an ongoing improvement in the rail sector's energy efficiency.



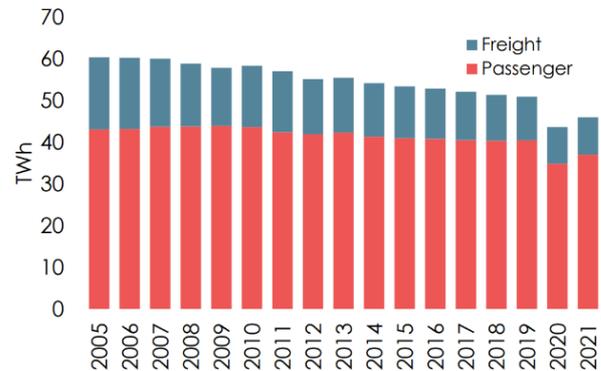
Source: UIC RSi (2022)

As described above, this improvement is also going to positively impact SDG 9, Target 9.4 which states *“By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities”*.



Within the UIC Traction Energy and Emissions Database (formerly ESRS) energy consumption is monitored and has been consistently reducing, demonstrating the significant energy saving efforts. Between 2005 and 2021:

- The total energy consumption of European railways decreased by 38%
- The energy consumption of passenger trains decreased by 20%
- The energy consumption for freight decreased by 68%



Total Energy Consumption. Source: Traction Energy and Emissions Database (2022)

In 2020, due to the pandemic, a general drop in consumption was recorded, and with the restrictions also being applied in 2021, the value was lower than in 2019.

Using 2005 as a baseline, the 2030 targets for European railways are for:

- Passenger services to reduce their own final energy consumption from train operation by 30%, measured per passenger-km. Moreover, they will reduce their own average CO₂ emissions from train operation by 50%, measured per passenger-km.

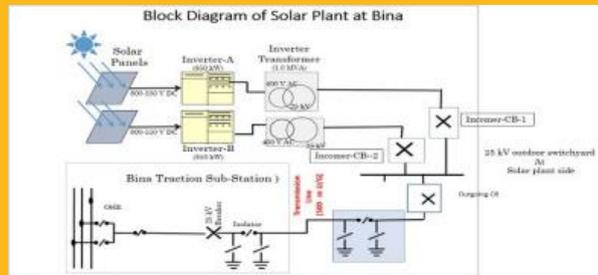
- Freight services to reduce their own final energy consumption from train operation by 30%, measured in gross tonne-km. Moreover, they will reduce their own average CO₂ emissions from train operation by 50% measured per gross tonne-km.
- Their total exhaust emissions of NO_x and PM10 to be reduced by 40%.

In order to face the current 2022 world energy crisis, in November 2022, UIC created the [Energy Saving Taskforce](#). Since railways are often one of the largest consumers of electricity in their country, especially during the hours of peak energy demand, the energy crisis has had a significant impact.

The European Commission, with the International Energy Agency, have appealed to businesses to both engage employees in finding opportunities to increase energy efficiency, as well as to facilitate multi-business networking for the joint development of their energy audits or energy management systems, training and sharing best practices. UIC already brings together many networks of experts from different fields and different railway undertakings, infrastructure managers, partners, and supply chains, and the taskforce takes this one step further by providing a platform for collaborative knowledge sharing on techniques to save energy (both electrical and fuel-based) and reduce costs for railway operations, as it is a technical expert group, open to all regions and perspectives.

Best use of zero carbon technology - Indian Railways: Bina Solar Plants

Indian Railways has 51,000 hectares of vacant land with a potential for producing 20GW of solar energy. These assets can help IR to achieve their target of being carbon neutral by 2030. Commissioned in 2020, IR has built two 865kW solar plants, located near one of their traction substations. The project is successfully up and running and has been tested and connected to the rail grid, to be used by running trains. The main challenge was to design and develop a single-phase inverter, as all inverters currently available on the market are three-phase. It was a world first to have such a large capacity plant (1.7mW) connected to the rail's overhead line system.





SUSTAINABLE SUPPLY CHAINS

CIRCULARITY & SUSTAINABLE PROCUREMENT

Railway supply chains are international, as materials and services are sourced from around the world. Therefore, their role in properly assessing and mitigating their externalities within their value chains is crucial to maintaining rail's status as a "sustainable mode of transport". For these reasons, the UIC RSi measures the actions taken on sustainable procurement matters and practices. As of 2021:

Of the RSi reporting companies:



Relevant requirements, and environmentally friendly clauses in procurement processes can improve the use and management of natural resources.

The [UIC REUSE project](#) has taken stock of best practices implemented by railway companies in the field of circular economy, where the basic principles include decreasing the amount of primary raw materials and natural resources used, by reusing components and materials that would otherwise be discarded in linear economies.³⁸

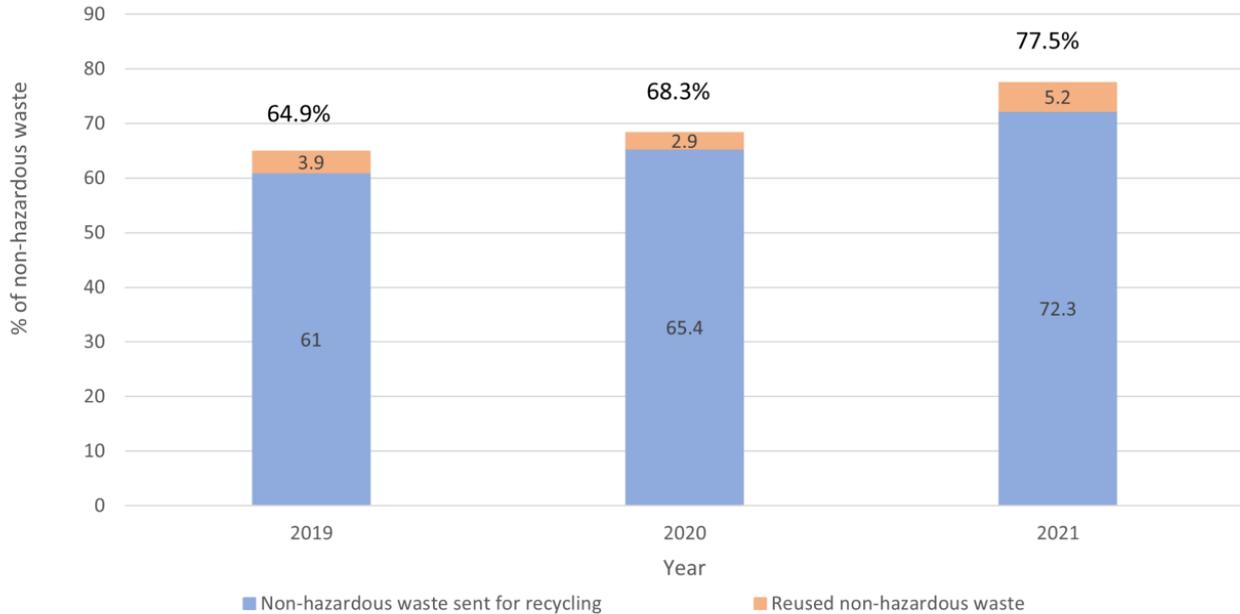
In the last three years of UIC RSi data collection, non-hazardous waste recycling and reuse has consistently improved, with a 3.4% increase recorded between 2019 and 2020, and an even more impressive +9.2% between 2020 and 2021. This demonstrates the industry's commitment to handling waste and embedding the principles of a circular economy in the management of natural resources.

Target 12.2

By 2030, achieve the sustainable management and efficient use of natural resources

³⁸ International Union of Railways (UIC). (2021b). *Circular practices in the railway and ways forward REUSE Project final Report* (ISBN 978-2-7461-3095-1). https://uic.org/IMG/pdf/reuse_project_final_report.pdf

Recycling and Re-Use of Resources

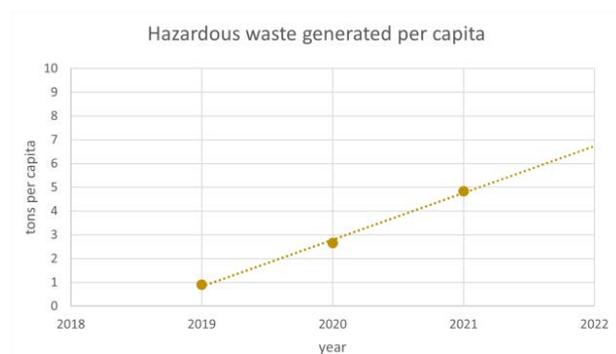


Source: UIC RSi (2022)

The graph shows the rail sector's contribution towards SDG 12 Target 12.4: *“By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimise their adverse impacts on human health and the environment”* and also on SDG 12 Target 12.5 which looks to the future: *“By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse”*.

Railway companies must continue to improve their performance in terms of waste management to fulfil the 2030 Agenda targets. UIC RSi data shows that hazardous waste generated per capita increased

between 2019 and 2021, which may be related to particular conditions of the pandemic, or changes in classifications of waste.



Source: UIC RSi (2022)

Best Circular Economy Project - NS – Circular Modernisation

With the “circular modernisation” project, NS gives 656 VIRM carriages a second life after 20 years in operation so that they can transport passengers for another 20 years. This prevents trains being disposed of (therefore reducing waste) and prevents new trains needing to be built (therefore scaling down the use of raw materials). 85% of the old train is reconditioned and reintegrated into the modernised train, while 14% is given a second life elsewhere.



SUSTAINABILITY GOVERNANCE & REPORTING

Sustainability reporting is the practice of disclosing environmental, social, and management performance within a company or organisation.³⁹ Increasing transparency on the impact of railways will foster trust and support improvements in sustainability practices.

A growing number of UIC members have been publicly publishing sustainability reports driven by customer demand as well as legal and stakeholder requirements. The RSi itself as well as company level production of a sustainability report supports SDG 12 Target 12.6 to “*Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.*”

Of the RSi reporting companies:



65%

issue a sustainability report

77% of them produce it in compliance with a standard (for example, GRI or SASB)



74%

have an environmental management system in place

92% of them have a certified system (for example, ISO14001)



³⁹ Sustainability Reporting. (n.d.). Ecovadis. <https://ecovadis.com/glossary/sustainability-reporting/>



THE ENVIRONMENT AND POLLUTION

BIODIVERSITY PROTECTION AND ENHANCEMENT

Railway networks need to expand to meet growing demand, however they must do this while respecting environmental regulations and biodiversity. Railways offer relatively undisturbed corridors and linear habitat features for wildlife, within a patchwork of different environments, such as embankments, ditches, and woodlands which provide a haven for a broad range of species. In Europe alone, the rail network runs for almost 230,000km and covers between 315,000 and 420,000ha of land. Nevertheless, rail is a very land efficient mode of transport, requiring just 7m² of land per passenger transported compared to 100m² per car passenger.⁴⁰

Through the [UIC REVERSE project](#), UIC aims to explore the effects of railways on European wildlife, creating a shared vision for protecting biodiversity. Moreover, the [UIC TRISTRAM project](#) has carried out a detailed investigation on alternative vegetation methods for sustainable land management and listed the possible methods of transitioning away from conventional chemical herbicides near railways. All of these international projects aim

to reduce the impact of railways on wildlife and biodiversity, highlighting the sector's vital role in the conservation and development of biodiversity assets and in providing technical and innovative solutions. The effort made towards protecting and developing biodiversity shows the support of the rail community towards SDG 15 Target 15.5 to *"Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species"*.

This is important as the European network extends through many different habitats, intersecting 2500 protected sites, with more than 400,000km² of protected areas being within 1km of the European rail network, as reported in the REVERSE ["European Railways: Strategy and Action for Biodiversity"](#) report. The REVERSE project demonstrates action being taken on Target 15.a to *"Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems"*.

⁴⁰ UIC (2022) European Railways: Strategy and Actions for Biodiversity. Available at: [European Railways: Strategy and Actions for Biodiversity \(uic.org\)](#)

Best Green Corridor - Network Rail – Biodiversity Monitoring

Network Rail has worked with global remote sensing experts to deliver a safe and efficient method of measuring biodiversity, with it being quantified for the first time in Britain's 200-year railway history. Green corridors help the movement of isolated species and wildlife communities, improving genetic diversity and helping to build resilience against potential changes in the climate. This new knowledge will enable an enhanced, targeted habitat management on railway property, improving the health and well-being of millions of passengers, neighbours and wildlife.



Under the Horizon 2020 EU funded programme, the [Biodiversity and Infrastructure Synergies and Opportunities for European transport networks \(BISON\)](#) project was launched to address issues regarding ecosystem fragmentation, biodiversity loss, and changes in land use due to transport infrastructure development. The project defines current best practices to integrate biodiversity into infrastructure planning and operations, identifying new trends in climate change scenarios, and their effect on transport.⁴¹

For 2023, the UIC Sustainable Land Use Sector aims to launch the Ecosystem Valuation for Railways (ECOV4R) project. The project will help to advance the understanding of how the railways benefit from the ecosystems on their land, such as in terms of weather resilience, carbon storing, and visual screening.

AIR QUALITY



In Europe, air quality has become an increasingly important issue in recent decades, and

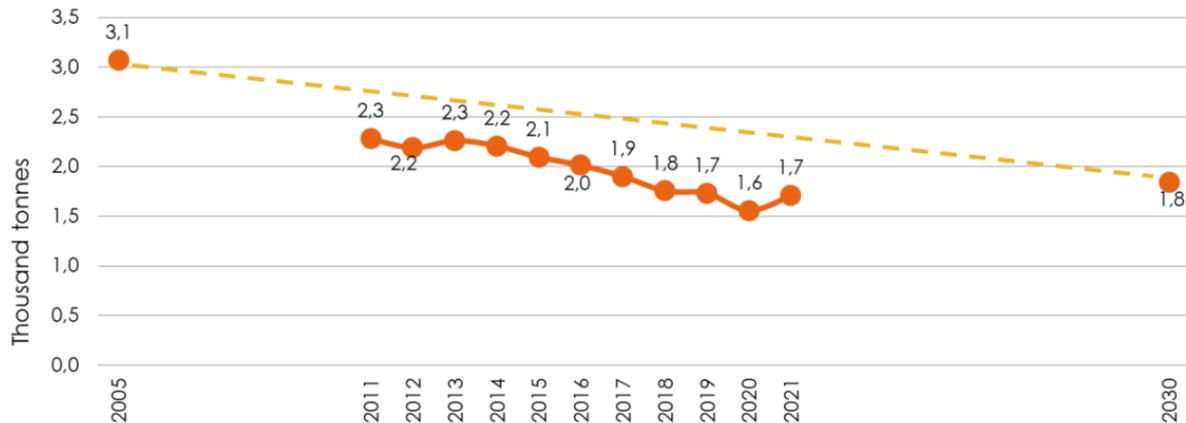
especially so in recent years,⁴² as links between low air quality and issues with human health and well-being as well as with ecosystems and biodiversity are progressively made. In fact, poor air quality is the number one cause of premature death in the EU. The transport sector has an undeniable effect on air quality; in the EU33 it is responsible for more than two thirds of all NOx emissions and accounts for at least 10% of the total emissions of other pollutants.

⁴¹ BISON (2020) *BIODIVERSITY AND INFRASTRUCTURE SYNERGIES AND OPPORTUNITIES FOR EUROPEAN TRANSPORT NETWORKS*. Available at: <https://bison-transport.eu/wp-content/uploads/2022/04/bison-presentation.pdf>

⁴² European Union Agency for Railways. (2020). *Report - Fostering the railway sector through the European Green Deal*. https://www.era.europa.eu/content/report-fostering-railway-sector-through-european-green-deal_en

EU policies have implemented measures for the transport sector to improve air quality, and between 1990 and 2017 a significant reduction of transport sector emissions was recorded, with a 44% reduction in PM_{2.5} and a 35% reduction in PM₁₀ between 2000 and 2017, despite general traffic for each mode of transport increasing. Road transport continues to account for the most significant proportion of these emissions, while the railways' share is minimal. In 2021, the rail sector only accounted for 0.54% of PM_{2.5} and PM₁₀ emissions.⁴³

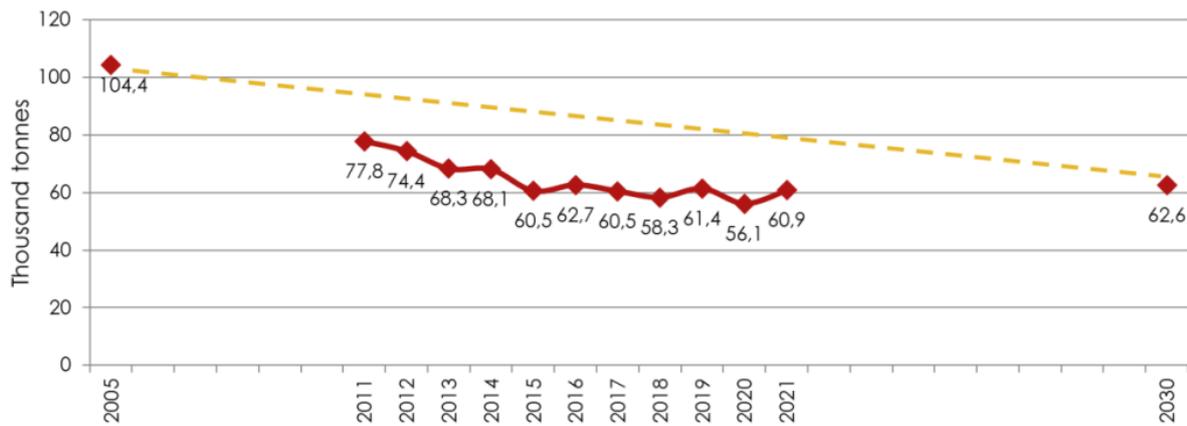
For 2021, the UIC Energy and CO₂ Traction Database recorded a decrease in total PM emissions of 44.4% from the 2005 baseline. The European railways have outperformed their own target by about 20% and have met the 2030 target more than ten years early.



Total Particulate Matter (PM) Emissions. Source: Traction Energy and Emissions Database (2022)

Furthermore, the total Nitrogen Oxide (NO_x) emissions in 2021 were reduced by 41.7% from the 2005 baseline. For NO_x too, the European railways have outperformed their objective by about 15% and have met the 2030 target.

⁴³ Emissions of air pollutants from transport. (2021). European Environment Agency. <https://www.eea.europa.eu/data-and-maps/indicators/transport-emissions-of-air-pollutants-8/transport-emissions-of-air-pollutants-8>



Total Nitrogen Oxides (NOx) emissions, Source: Traction Energy and Emissions Database (2022)

This outstanding performance highlights the role of rail transport in delivering high quality transport with a low impact on air quality, positively supporting SDG 11, Target 11.6 which states “By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management” as well as supporting SDG 3 Target 3.9: “By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.”



BEING A GOOD NEIGHBOUR: QUIETER RAIL

Noise and its implications on health and the environment has been considered in the European Commission’s “EU Action Plan: Towards a Zero Pollution for Air, Water and Soil” with a target of reducing the number of people chronically disturbed by transport noise by 30% compared to 2017. Railways are investing in innovative mitigation processes to help do their part in achieving this target.

The UIC report “[Railway Noise in Europe – State of the art](#)” illustrates the recent developments in noise reduction. Railways have introduced a range of measures in order to prepare for traffic and networks expanding in the future and to meet the World Health Organisation’s suggested limits for Europe.

The Technical Specification for Interoperability relating to the rolling stock subsystem “noise” (TSI Noise) sets out the ideal and optimal levels of harmonisation to limit railway system noise in the EU via the retrofitting of freight wagons with composite brake blocks and by introducing “Quieter Routes”.⁴⁴ These routes are stretches of the railway network at least 20km in length, which serve more than 12 freight trains at night. The adoption of the quieter routes will also benefit other lines as the system will limit “noisy” freight trains on these lines. These new limits are expected to have a positive effect on 90% of the people living close to railway tracks.

European railways continue to work together to improve decision making through the [UIC Noise and Vibration Technical Advice \(NOVITÀ\) project](#). In 2022, the project released a summary of a preliminary study on “[the nuisance and health impacts of railway noise](#)” which investigated complaints in detail and the key factors for implementing certain noise mitigation measures. It also demonstrates that a better understanding of the health effects of noise will improve appropriate policy making in this field. Additionally, an analysis of operational and technical solutions for the management of parked and stationary trains, with a focus on Europe, was also carried out, a report was prepared with the UIC members, and the next steps to be taken were identified.



⁴⁴ International Union of Railways (UIC) Sustainability, Railway Noise in Europe, State-of-the-art report, 2021



ADAPTING TO CLIMATE CHANGE AND WEATHER RESILIENCE

Climate change presents an increasing risk to the operations of railways due to the impact of more severe and frequent extreme weather events. These events can have serious operational and economic consequences as well as causing harm to human lives.⁴⁵ The intensity, frequency, and duration of heat waves are increasingly posing challenges to all modes of transport.⁴⁶ Extreme heat can cause infrastructure failures such as overheated passenger carriages, buckled rails and drooping of overhead wires. Extreme rain events can cause flooding, track wash out and embankment slippage. For these reasons, the rail sector is changing rolling stock and infrastructure design, maintenance and emergency planning to be more weather resilient and better adapt to a changing climate.

The development of technical solutions, infrastructure, and assets capable of adapting to the pressures of climate change helps fulfill SDG 9 Target 9.1 to “Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all” and SDG 13,



Target 13.1 to “strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries” from 2022.

In order to support both of these goals, the [UIC Resilient Railways facing Climate Change: Heavy Rains \(ReRa-Rain\)](#) project has been launched, which aims to identify and assess rail’s vulnerabilities and how to manage them, by developing solutions for adaptation and resilience. This will be done by evaluating embankment and cutting stability and consequences on infrastructure as well as operational delays and line closures.

Of the RSi reporting companies:



⁴⁵ Palin, E.J. et al. (2021) “Implications of climate change for railway infrastructure,” *WIREs Climate Change*, 12(5). Available at: <https://doi.org/10.1002/wcc.728>
⁴⁶ UNECE (2020) *Climate Change Impacts and Adaptation for Transport Networks and Nodes*. United Nations. Available at: https://unece.org/sites/default/files/2021-01/ECE-TRANS-283e_web.pdf



THE RAILWAY AS A DIVERSE AND INCLUSIVE WORKPLACE

UIC members are making positive changes to ensure that the railways are a more inclusive and diverse place to work.

The transport sector has traditionally been a male-dominated industry, and even now, in Europe, women account for 22% of the workforce.⁴⁷ The sector faces concerns in relation to career growth opportunities, the gender pay gap, and safe working conditions for women. Several challenges for women were identified in the rail sector, which include women's roles being the lowest paid in the industry, the struggle to reach managerial positions due to policy or legislative barriers, and workplace health and personal security especially regarding sexual harassment, maternity leave, and pregnancy.⁴⁸

Target 5.1

End all forms of discrimination against all women and girls everywhere

Target 5.C

Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels

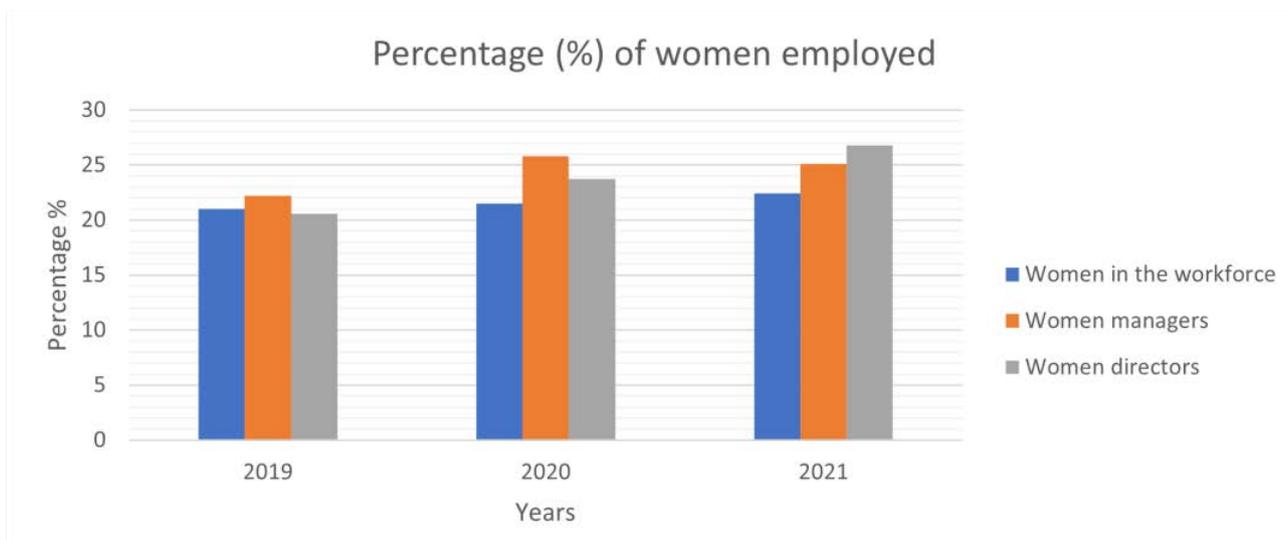
In order to address this issue, UIC members are implementing a non-discrimination framework, with 88% of UIC RSi participants having a non-discrimination code in place, of which 93% actively monitor the effectiveness of the code itself. Having this code contributes towards fulfilling SDG 5 Target 5.1 to “*End all forms of discrimination against all women and girls everywhere*”.

Of the RSi reporting companies:



⁴⁷ European Commission. (2023). 2022 report on gender equality in the EU (doi:10.2838/94579). https://commission.europa.eu/system/files/2022-06/annual_report_ge_2022_printable_en.pdf

⁴⁸ <https://www.itfglobal.org/en/sector/railways/women-and-youth-in-railways>



Source: UIC RSi (2022)

The UIC RSi figures for women in the workforce in 2019 are in line with European Commission data for the same year regarding female employment in the transport sector. The RSi data shows an overall annual increase from 22% in 2019 to 25% in 2021 for women in the workforce. These slow but positive changes are encouraging and can be expected to further improve as policies continue to come into effect. The exception to this trend is for female managers, which decreased slightly in 2021 over 2020 and may be the result of the pandemic and its impact on women in the workplace.

Several cross-industry initiatives and activities are currently underway in the rail sector, such as the [“Women Mobilize Women - Transformative Urban Mobility Initiative”](#) and the [“Women in Transport – the EU platform for Change”](#) funded by the European Commission, which released the European Social Partner Agreement on Women in Rail in 2021. This agreement, the first one on gender equality at EU level in any sector, is based on the principles of non-discrimination, equal treatment, and equal opportunities.

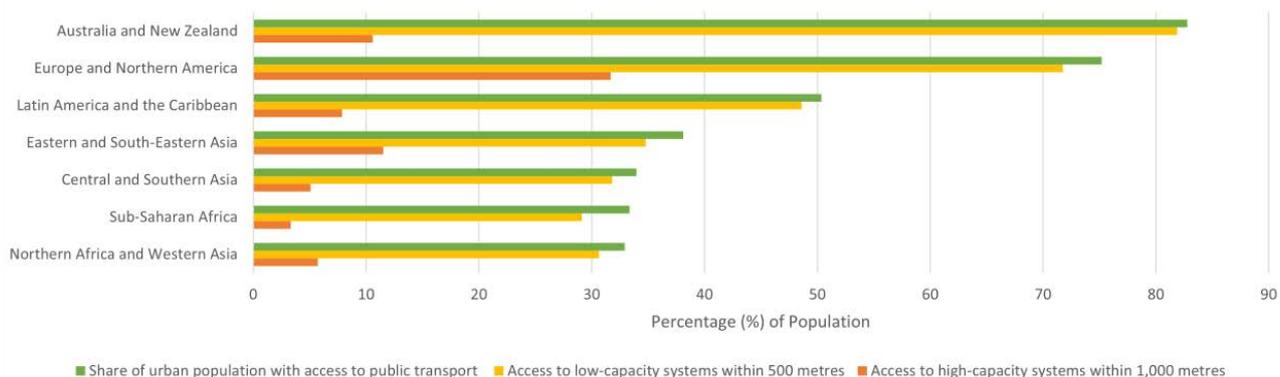


INCLUSIVE TRAVEL, STATIONS AND INITIATIVES

Sustainable transport is an important part of SDG 11 – Sustainable Cities and communities, which highlights the need for convenient, safe, reliable and inclusive public transport. In a 2020 study

of 1510 cities around the world, 37% of urban populations were served by public transport, which only translates to about 52% of the world population having convenient access to public transport.⁴⁹

Percentage of urban population with convenient access to public transport, 2019



Source: United Nations Statistics Division (2022)

UIC members are working to improve the accessibility of transport services to a wider range of people including those with disabilities. In order to make rail fully inclusive, the stations and services have to be physically accessible for all, since this is a crucial factor in how people choose to travel.

The [UIC Passenger Accessibility Solutions Support and Action Group of Experts \(PASSAGE\)](#), established in 2010, works together on matters and policies regarding accessibility and passengers with reduced mobility (PRM) and additional needs. This group has become a trusted information source on railway accessibility in European railways, even gaining recognition globally.

⁴⁹ The Sustainable Development Goals Report 2022. United Nations Statistics Division 2022. <https://unstats.un.org/sdgs/report/2022>

The group has developed the PRM Assistant Booking Tool (ABT) system, which provides assistance for passengers travelling internationally and serves as an interface between local assistance booking tools. The group currently includes 23 UIC members, 17 of which use the PRM ABT. PASSAGE's efforts and the use of their ABT is an example of the railway

sector's contribution towards SDG 11 Target 11.2: *“By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons”.*



Source: UIC (2022)

The concept of inclusivity within the rail sector is not limited to the rail's workforce and passengers. Stations are a community hub and a key public space as they enable access to basic services in a central location, and as they offer safety and shelter,

a station can attract the homeless community. Since 2020, UIC has funded the [“Inclusive Stations” working group](#), aimed at exchanging good practices to better help those sleeping on the streets.

Best Diversity and Inclusion Initiative - Network Rail & Shelter

Between October 2020 and November 2021, Network Rail and Shelter (a homeless charity) carried out a 12-month pilot project which supported people who sleep rough in and around the English stations of Manchester Piccadilly and Birmingham New Street to access and keep accommodation. They also offered referrals to mental health and substance misuse support services in order to help clients overcome the complex barriers to securing and keeping a home.

Through a change in approach, Network Rail colleagues were able to support homeless people in getting the help that they need. The project took a user-centred approach, tailoring the support given to the needs of the individual.



Rebuilding confidence in rail - Network Rail – King's Cross Station

Network Rail has been developing the waiting areas around King's Cross Station, using a circular, state of the art sustainable solution that improves wellbeing on a different scale. As a result, waiting area satisfaction has gone from around 30% to above 80% as well as having a remarkable effect on businesses. The general pace has slowed down, and passengers are now coming earlier to the station to spend time there eating, reading, or having a coffee.



Source: Hutton+Crow et al., 2012



RAIL EMPLOYMENT AND ECONOMIC GROWTH

GREEN JOBS AND DECENT WORK

Transport is a key sector for the functioning of national and international economies worldwide. According to the European Commission (2022), in the EU, the transport sector employs over 10 million workers, accounting for 5% of gross domestic product (GDP) comprising of approx. 1.1 million businesses.^{50,51} More precisely, the European rail sector employs around 2.3 million people or 1.1% of the GDP of the Member States and these numbers are only expected to grow⁵².

Specifically for rail, UIC member data shows that all regions have large workforces, with Asia representing not only the largest number of employees but also the highest average per company, followed by Europe and America. Furthermore, due to gaps in data reported in 2021, the total workforce has most likely been underestimated when compared to previous years.

	Companies	Total Employees
Africa	5	36.119
America	8	187.416
Asia	16	3.131.568
Europe	55	978.750
Oceania	2	11.407
World	86	4.345.260

Source: UIC RAILisa

Rail sector growth has the potential to mitigate job loss caused by the possible shrinkage of the fossil fuel, automotive, and aviation sectors. Approximately 2.4 million new jobs are expected to be created globally with planned road and rail infrastructure, with a GDP increase of 0.1% for North America and Australasia, 1.3% for lower income countries, and 0.9% for upper middle income countries outside of Europe, North America and Australasia.⁵³

⁵⁰ European Commission. (2021). *Sustainable and Smart Mobility Strategy: Putting European transport on track for the future.* <https://transport.ec.europa.eu/system/files/2021-04/2021-mobility-strategy-and-action-plan.pdf>

⁵¹ *Transport sector economic analysis.* (2022). EU Science Hub. [https://joint-research-centre.ec.europa.eu/scientific-activities-z/transport-sector-economic-analysis_en#:~:text=Transport%20plays%20an%20important%20role.gross%20domestic%20product%20\(GDP\)](https://joint-research-centre.ec.europa.eu/scientific-activities-z/transport-sector-economic-analysis_en#:~:text=Transport%20plays%20an%20important%20role.gross%20domestic%20product%20(GDP))

⁵² European Union Agency for Railways. (2020). *Report - Fostering the railway sector through the European Green Deal.* https://www.era.europa.eu/content/report-fostering-railway-sector-through-european-green-deal_en

⁵³ United Nations Environment Programme (2022). *Mapping environmental risks and socio-economic benefits of planned transport infrastructure – a global picture.* Nairobi

The EU transport sector is facing several employment-related challenges such as an ageing workforce and staff shortages, as due to automation and digitalisation, there is a need for highly skilled employees. For these reasons, according to the European Commission, a highly skilled workforce is the transport sector's most important asset.⁵⁴

The UIC RSi scores map the importance and impact of the role of railway companies as decent job providers, treating their workforce fairly, and implementing adequate internal policies for the rights of their workforce according to SDG 8 Target.

Target 8.5

By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

Target 8.8

Protect labor rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment

Of the RSi reporting companies:



SUSTAINABLE FINANCE AND ECONOMIC GROWTH

The finance sector and the legal tools that influence the flow of money will play an important role in financially supporting the shift towards climate resilient growth and a sustainable economy.⁵⁵

For example, the domain of green finance is currently providing capital for assets that can mitigate the effects of climate change, thereby also supporting SDG 13. Railway projects, designed according to prevailing weather conditions and climate change projections, also have the possibility of receiving financial contributions.⁵⁶

⁵⁴ European Commission (2022) *Social issues, Equality and attractiveness of the transport sector*. Available at: [Social issues, Equality and attractiveness of the transport sector \(europa.eu\)](https://ec.europa.eu/transport/themes/social-issues_en)

⁵⁵ FINGER, Matthias, SERAFIMOVA, Teodora, LAPENKOVA, Irina, *Green finance and sustainability : which role for railways?*, Policy Briefs, 2019/05, Florence School of Regulation, Transport - <http://hdl.handle.net/1814/61345>

⁵⁶ Climate Bonds Initiative (2018) *Green Bonds – A Bridge to the SDGs: Climate mitigation and adaptation underpin meeting the UN Sustainable Development Goals*. Available at: https://www.climatebonds.net/files/reports/green-bonds_a-bridge-to-the-sdgs_062018.pdf (Accessed: December 6, 2022).

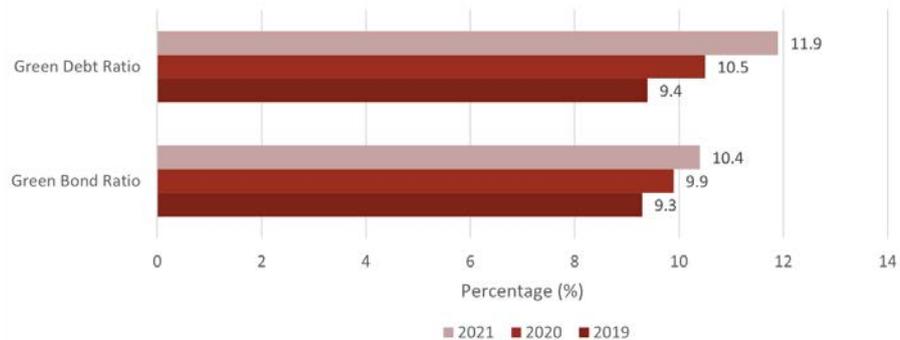
The EU has also been sweetening the pot, with its 2018 Action Plan on sustainable finance, including an updated programme for reorienting capital flows towards a more sustainable economy, such as creating an EU green bond standard to help the financing of sustainable projects. Under the EU Green Deal, the European Commission also adopted the “EU Taxonomy”, which represents a classification system defining which economic activities are sustainable. The taxonomy sets out to more clearly define what constitutes a sustainable investment. Currently, only 2.6% of the total EU bonds issued are green bonds.⁵⁷

Rail can be defined as sustainable and in compliance with the EU Taxonomy if specific CO₂ emission targets are met in relation to interurban passenger, freight, urban and suburban transport performance.⁵⁸

Other concrete investment which supports the rail sector’s projects includes the Railway Infrastructure Reinforcement Project in Morocco, funded also by the African Development Bank and the \$440 million USD World Bank loan for Egypt’s [Railway Improvement and Safety for Egypt \(RISE\)](#) project to modernise signalling and improve the network’s performance and competitiveness.

For the UIC RSi participants, green and climate related financial products are increasingly important as both green bonds and green debts are now being included as index KPIs. The climate-related Green Bond Ratio is an average (expressed as the total amount of outstanding green bonds (at year-end) divided by (a 5-year rolling average of) the total amount of outstanding bonds and the climate-related Green Debt Ratio is an average expressed as the total amount of all outstanding green debt instruments (at year-end) divided by (a 5-year rolling average of) the total amount of all outstanding debt.⁵⁹ The average percentage has been increasing every year.

Percentage (%) of Green Bond Ratio and Green Debt Ratio



Source: UIC RSi (2022)

⁵⁷ Questions and Answers: European Green Bonds Regulation. (n.d.). European Commission. https://ec.europa.eu/commission/presscorner/detail/en/ganda_21_3406

⁵⁸ European Union (2021) COMMISSION DELEGATED REGULATION (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R2139&from=EN>

⁵⁹ European Commission (2019) Guidelines on reporting climate-related information. Available at: https://ec.europa.eu/finance/docs/policy/190618-climate-related-information-reporting-guidelines_en.pdf



PROMOTING PEACE AND CRISIS SUPPORT

RAIL'S RESPONSE TO THE RUSSIAN INVASION OF UKRAINE

The railways are playing a key role in transporting goods to help guarantee Ukraine's ability to continue to export and import during the Russian invasion. Rail has helped to keep the Ukraine connected, not only to continue the movement of goods and supplies, but also to safely evacuate refugees. Rail freight is helping to export agricultural products, which are particularly critical since Ukraine is one of the world's largest grain producers. In the period between May and September 2022 roughly 15 million tons of goods were exported from Ukraine via the solidarity lanes.⁶⁰

In March 2022, UIC established the [UIC Refugee Taskforce](#) in order to facilitate UIC member companies in facing the challenges of this crisis. The meetings helped European members to collaborate and coordinate their support for refugees and communicate with the Ukrainian railways. The taskforce helped the members to improve their knowledge and apply good practices in relation to migration flows, exchanging information with infrastructure managers and rail operators on topics such as communication and security. The UIC "[Management of refugee crises](#)" report is a collection of UIC member practices and the potential measures to be implemented within the railway sector. These measures represent a contribution to SDG 16 Target 16.1 to "*Significantly reduce all forms of violence and related death rates everywhere.*"



⁶⁰ European Commission (2022) *Joint Declaration - 1 billion euro mobilised for Solidarity Lanes to increase global food security and provide a lifeline for Ukraine's economy*. Available at: https://ec.europa.eu/commission/presscorner/detail/en/statement_22_6825

CONCLUDING MESSAGE FROM THE UIC SUSTAINABILITY PLATFORM CHAIR

As the first ever UIC Global Sustainability report shows, 2022 has seen vital progress in many areas, with growing ambition and action within the railway. There is encouraging improvement in energy efficiency, in the use of renewables while phasing out diesel, and in leadership and governance processes to deliver the UN Sustainable Development Goals.

However, the data collected is not yet representative of the global situation, and UIC strives to support members in all regions to better monitor and report on sustainability performance.

There is still significant potential for improvement, with there being a long way to go to achieving the 40% modal share increase by 2030 that is necessary according to IEA estimates to be on track to decarbonising mobility by 2050. For this we need systemic change. It is not only up to rail companies, also governments, financial institutions, civil society, and the business community need to work together to deliver the transformation. The More trains campaign, launched in 2022 at COP27, will continue to highlight the importance of these key steps to support the advancement of rail:



Christine Vanoppen

Chair of UIC Sustainability platform

*Reputation Environment and Governance Manager
LINEAS*



MEET THE AUTHORS

This report has been compiled by the UIC Sustainability Unit, secretariat to the UIC Sustainability Platform.



Lucie ANDERTON
Head of Sustainability
ANDERTON@uic.org



Pinar YILMAZER
Senior Programme Advisor
Noise & Vibration and
Sustainable Land Use
YILMAZER@uic.org



Isabelle DE KEYZER
Advisor Rail Sustainability
Index & Circular economy
DEKEYZER@uic.org



Philippe STEFANOS
Advisor Energy & CO2 and
Air Quality
STEFANOS@UIC.org



Joo Hyun HA
Sustainability Strategy and
International Partnership
Senior Advisor
HA@uic.org



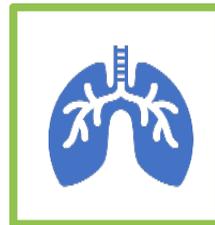
Lorenzo FRANZONI
Sustainability Jnr. Advisor
Franzoni@uic.org

THE UIC SUSTAINABILITY PLATFORM

The platform has three key objectives



Working in 5 technical sector groups



INTERNATIONAL UNION OF RAILWAYS

16, rue Jean Rey - 75015 Paris - France

Tel. +33 (0)1 44 49 20 20

Fax +33 (0)1 44 49 20 29

E-mail: info@uic.org

Published by: UIC Sustainability Unit

Director of publication: Lucie Anderton

Authors: Lucie Anderton, Pinar Yilmazer, Isabelle De Keyzer, Philippe Stephanos, Joo Hyun Ha, Lorenzo Franzoni

Infographics: Coralie Filippini

Cover and layout: Ludovic Wattignies

Photo credit: SNCF, NS, Network Rail

Printing: UIC

ISBN 978-2-7461-3259-7

Copyright deposit: March 2023

www.uic.org



#UICrail



The UIC supports the Sustainable Development Goals