



European Rail
Infrastructure
Managers



Joint Position Paper

Brussels, 29th November 2018

EU Strategy for long-term greenhouse gas emissions reductions – The crucial role of rail

EU Strategy for long-term greenhouse gas emissions reductions

The crucial role of rail

Executive summary

The EU has been at the forefront of international efforts towards the Paris climate agreement and took legislative steps to implement its target to reduce greenhouse gas emissions by at least 40% by 2030. On 28th November 2018, the European Commission has published a Communication on the long-term strategy for GHG emissions reduction ahead of the 24th session of the Conference of the Parties, taking place in Katowice in December 2018. Transport emissions are the main obstacle in delivering the EU's climate objectives. Decarbonisation of the transport sector remains both a challenge and an opportunity for the greenhouse gases reduction policy. Rail is the only mode reducing its emissions and thanks to energy-efficient zero carbon railways there can be more transport activity with lower and lower emissions in Europe.

Welcoming the initiative on a long-term EU Strategy for emissions reductions, the Community of European Railway and Infrastructure Companies (CER), the Association of the European rail infrastructure managers (EIM) and the Association of the European rail supply industry (UNIFE) suggests policymakers to seize the opportunity by acting now to accelerate decarbonisation of the transport sector. In particular, CER, EIM and UNIFE urge the Commission to foster win-win cooperation in climate change by rapidly reinforcing low emission mobility in Europe through:

- Realise **sustainable modal shift targets** to reach emission reductions needed in the transport sector, in full compliance with the ambitious goals set in the Paris agreement (COP21) and in the Nationally Determined Contributions (NDCs).
- Maintain **a reporting mechanism for Member States** to monitor, incentivise and facilitate their progress in reducing transport emissions. Annual reports should be published so as to incentivise Member States to achieve progress.
- Foster the implementation of the 2011- Transport White Paper, confirming in legislation at least 60% reduction target for transport emissions by 2050 compared to 1990 levels, with **an additional binding target for 2030**.
- **Internalise external costs in all transport modes** based on polluter pays principle
- As recently being agreed by the ministers under the Graz Declaration promote **rail as backbone of sustainable mobility, both for urban, sub-urban and medium/long-distance transport**, and its interconnectivity with other low-carbon modes.
- Ensure best use of EU funds for a successful budget for covering investment needs of sustainable transport projects beyond 2020; in addition to new Connecting Europe Facility, allocate sustainable finance such as green bonds accessible only for low emissions sectors.
- Further electrify and upgrade the rail network (regional as well as main lines), as **electrified railway transport is by far the most efficient form of e-mobility**, where carbon savings and the economic case of such projects are positive.
- Support the development and market introduction of **zero-emission, energy-efficient technologies**– where this is based on the assessment of the total life-cycle process.
- Taking stock of the fundamental work carried out within Shift2Rail Joint Undertaking, continue and intensify support to rail research and innovation – notably **extending the Shift2Rail programme within Horizon Europe 2021-2027** with a significantly larger adequate budget

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1. Introduction

The Community of European Railway and Infrastructure Companies (CER), the Association of the European rail infrastructure managers (EIM) and the Association of the European rail supply industry (UNIFE) welcome the European Commission's initiative to present a strategy for long-term EU greenhouse gas (GHG) emissions reductions in accordance with the Paris Agreement. The strategy can be a game changer and set the pace for achieving net zero emissions by 2050. Building on the legislative implementation of the EU 2030 framework on climate and energy policies, the strategy should steer Europe to urgently move away from fossil fuels towards a low-carbon economy, while also reaching high efficiency standards.

Transport represents almost a quarter of Europe's Greenhouse Gas emissions, and it is the only sector failing to reach the decarbonisation objective. Decarbonisation of the transport sector remains both a challenge and an opportunity. A low-carbon transport and energy system is crucial to deliver the 2050 goals and European railways are the best low-and zero emission solution to decarbonise transport – already widely available today. Therefore, rail must evolve towards being the backbone of a low-carbon transport system in Europe. With the present Position Paper, the three Associations wish to give their contribution to the prospective debate over the EU strategy on GHG emission reductions, highlighting the rail sector's assets as well as its crucial role in order to achieve the European Commission's long-term ambitious objectives.

2. The crucial role of the rail sector in achieving GHG emission reductions

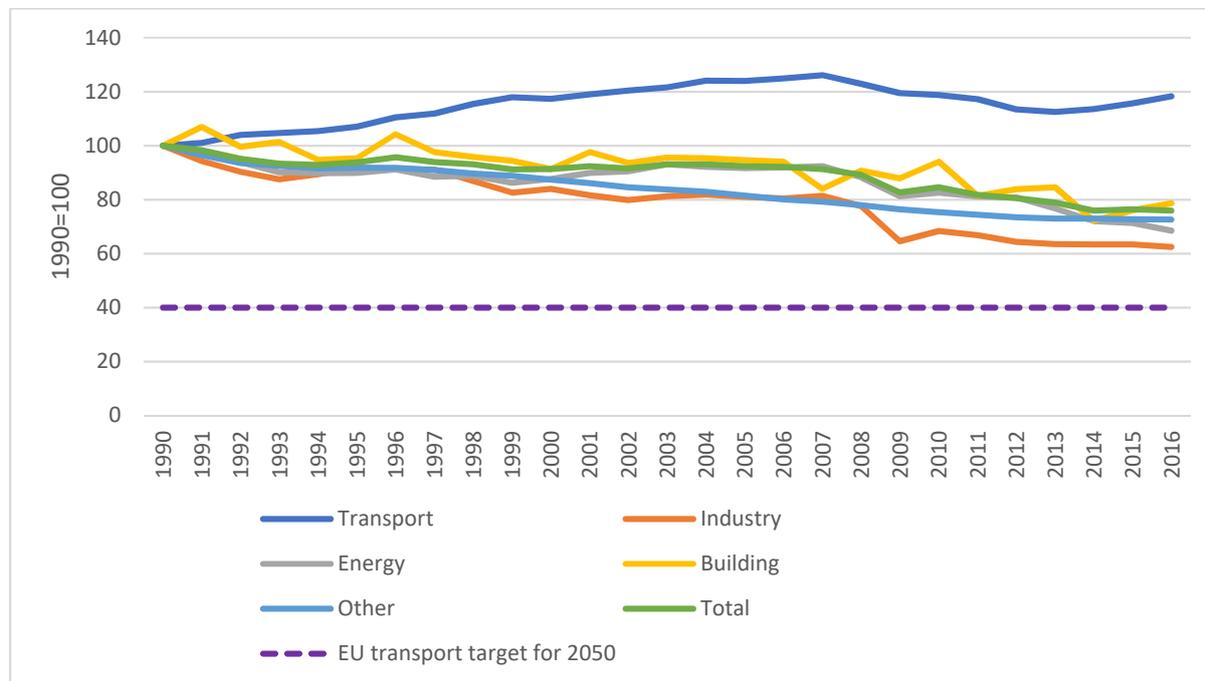
Figure 1 shows that there is a general downward trend to GHG emissions in Europe since 1990. Transport remains the second largest GHG-emitting sector after energy production¹ – being responsible for 24% of the EU's GHG emissions. According to the European Environment Agency (EEA) GHG emissions decreased in majority of sectors between 1990 and 2016 in Europe however, transport is the single exception in which emissions are increasing². Furthermore, emissions from transport are growing faster than any other sector. Rail is the exception – it is the only mode of transport which has reduced its emissions while increasing passenger and freight volumes. Energy-efficient low-emission railway is therefore the solution to address the current emissions gap compared to the ambition for 60% GHG reduction target by 2050 for transport, as set in the 2011 Transport White Paper.

¹ Fuel combustion and fugitive emissions from fuels

² Transport GHG emissions, after a peak in 2007 followed by a 10% decrease for 2007-13, are increasing since 2013.

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Figure 1: GHG emissions in the EU in percentage change 1990-2016



Source: EEA, 2018

Challenge of delivering EU's GHG reduction targets

Need for decarbonisation in road, maritime and aviation sector are beyond dispute as recently highlighted in the special report by the UN's Intergovernmental Panel on Climate Change (IPCC). Acknowledging the growing interest in these sectors, the railway sector reminds the policy makers that rail is central to substantially contribute to the EU mid-century target to reduce GHG emissions in the transport sector by 60% compared to 1990 levels. Rail combines energy-efficient mobility with fewer emissions. Furthermore, the sector has established its own sustainable mobility strategy on a voluntary-basis. This shows the ambition of Rail to provide the society with a climate-neutral transport alternative, as part of the wider move to decarbonise transport³. Rail sector has pledged to reduce total CO₂ emissions for passenger and freight transport by 30% by 2030 compared to 1990. According to latest data reported by the International Railway Union (UIC) and the International Energy Agency (IEA) currently European railways are outperforming and on track to meet these targets (UIC IEA Railway Handbook 2017).

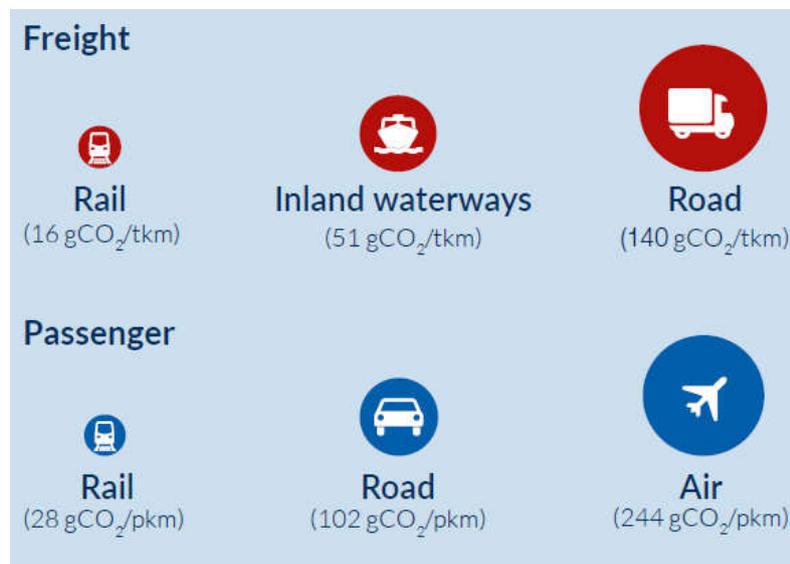
According to the EU Transport in figures statistical pocket book and Eurostat energy data, rail's specific energy consumption is 6 times lower than road due to physical advantages such as lower rolling and air resistance. The leading performance of rail in terms of GHG emissions is also well-documented by the EEA indicator, as depicted in Figure 2. Travelling by rail⁴ is 9 times less CO₂ intensive compared to road for freight and air for passengers.

³ Rail sector targets are presented and explained in the CER-UIC "Rail transport and environment: facts & figures", chapter 8 <http://www.cer.be/publications/latest-publications/rail-transport-and-environment-facts-figures>

⁴ Rail specific CO₂ emissions include direct emissions (from diesel traction) as well as indirect emissions (from electricity traction)

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Figure 2: Specific CO₂ emissions per transport mode



Source: EEA, 2017

In addition, the longer service life and multiple annual mileage of rail vehicles compared with private passenger cars allows a massive reduction in raw material requirements per passenger/kilometre, which makes an additional contribution to reducing emissions and environmental pollution in the producing countries.

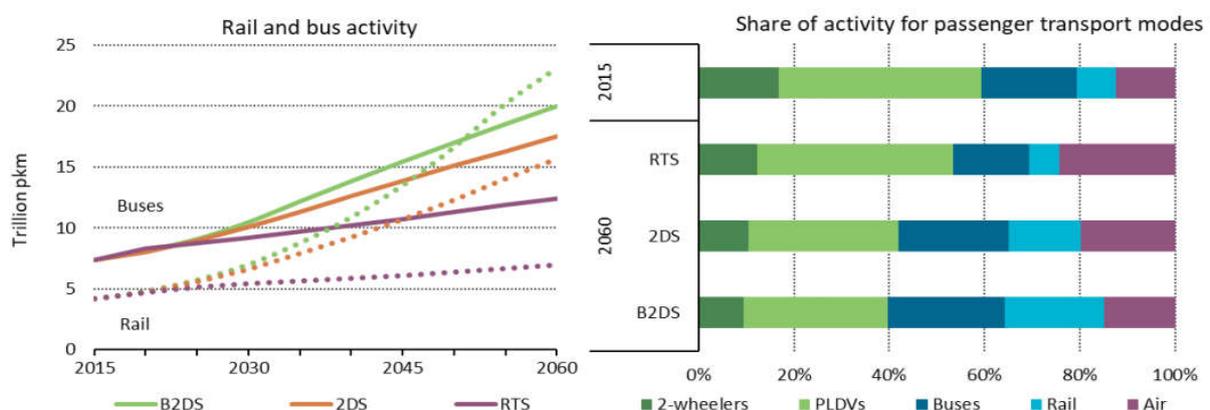
Finally, as displayed by the Figure below, rail remains crucial to achieve ambitious decarbonisation objectives when electrification and other solutions are not sufficient. Figure 3, specifically, underlines that the higher the decarbonisation ambition is set, the higher the share of public transport, and especially rail, must be.

Figure 3: RTS =reference scenario / 2DS = 2°C / B2DS = below 2 °C.

Major shifts from private cars to public transport



Bus and rail activity by scenario and passenger transport activity by mode, 2015-2060



Measures to shift and to avoid passenger transport result in a 25%-27% reduction in pkm on cars by 2060, relative to the RTS

Source: IEA

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Opportunity for the climate from sustainable modal shift

The 2011-Transport White Paper formulates an integrated vision of how transport should look in the year 2050 – with concrete intermediate goals for the year 2030 to make the scope of the transformation task more tangible. Modal shift is, indeed, a cornerstone of this vision.

Granted, CER, EIM and UNIFE believe that with a modal shift to low-emission modes such as railway the EU transport sector would achieve cost-effective decarbonisation, contributing in a crucial way to the accomplishment of the objectives set in the Paris Agreement – COP 21.

Recommendations

- Modal shift to low-emission transport modes shall remain at the heart of the EU long-term strategy for greenhouse gases reduction.
- Foster the implementation of the 2011- Transport White Paper, confirming in legislation the net zero-emission target for transport emissions by 2050, with additional binding targets for each year in between.

3. European railways promote electrified transport

European railways are already able to offer carbon neutral mobility. More than half of rail infrastructure is electrified and 4 trains out of 5 are already running on electricity which, in addition, is steadily becoming greener. According to the UIC IEA Railway Handbook 2017, 40% of the electricity mix used by railways in Europe is low-carbon and electricity by renewables sources supplied to railway sector reached more than 20% in 2015. This is already beyond EU's 2030 renewable energy target for transport. Decarbonising transport and energy must go hand in hand and the sector favours further development of renewables.

Fitting railway stations with charging facilities for all kinds and sizes of scooters, bikes, and electrical vehicles is crucial to support electrification. Smart Grids should be promoted to aid the storage and optimise use of the electricity, and railway stations can be a key component of those smart grids by marketing close-by storage of braking energy of rail vehicles into the batteries of the feeder vehicles.

There are no technical obstacles to further electrification, but the cost for upgrading and electrifying the existing rail infrastructure and the expected carbon reduction need to satisfy positive economic net present value. Combining further rail electrification of busy lines and cross-border missing links – supported by EU funding – with renewable energy supplied to railway grid, could deliver a massive emission reduction. Where the classical electrification solution with overhead lines is not economically justified, such as low-density lines or last mile, the rail sector requires sustainable alternative energy sources as a substitute to classic diesel propulsion concept⁵. Focus should also be given to marketability of new clean technologies⁶, to ensure that rail becomes the first zero-emission mode.

In the meantime – as railways advance toward a carbon-neutral objective – a modernisation of existing fleets with the latest compression-ignition technology and deployment of bi-mode and hybrid solutions, with improved fuel consumption⁷, would take

⁵ For instance, battery powered trains, or hydrogen trains, on specific sections can allow minimal electrification, e.g. on part of the line where electrification cost is maximal.

⁶ Such as battery vehicles and fuel cells, or gas and hydrogen combustion engines.

⁷ As highlighted by the CleanER-D project (<http://www.cleaner-d.eu>).

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place. Shift to low-emission modes such as rail could only be achieved once level playing field is guaranteed for competing modes. Rail sector favours full internalisation of all external costs for all modes. This requires a strong carbon pricing in the transport sector, with a revenue-neutral link to the overall tax system. Rail, as a major electric transport mode is currently the only mode paying into the EU Emissions Trading System (ETS) and being penalised by environmental-related charges unlike more carbon intensive modes: aviation sector continues to receive ETS allowances free and road transport is not under the scope of the ETS. The policy makers should urgently address internalisation of external costs, starting with an effective CO₂ pricing for all modes. Until this is achieved Member States should compensate low-carbon modes through allocating equivalent share of ETS auction revenues.

Recommendations

- The support for electrification of rail network should continue, whenever economically justified. If electrification is not economic viable, support for the marketability of alternative clean technologies should be given.
- Implement a strong carbon pricing policy by systematic application of polluter-pays principle across all transport modes.

4. The role of research and innovation towards a zero-carbon economy

Research and innovation (R&I) play a fundamental role in supporting and fostering the rail sector's decarbonisation efforts. Through constant improvement of rail's performance in terms of energy efficiency and life-cycle cost of its components, and by boosting rail's technological advancement, R&I investments contribute in a significant way to the strategy of greenhouse gases emissions reduction.

The collaborative-research model developed within the Shift2Rail Joint Undertaking (S2R JU) is, in this regard, exemplary. Shift2Rail has represented unprecedented commitment of all the stakeholders of the European rail sector to invest together in research and innovation, ensuring the continuity, stability and effectiveness of collective innovation efforts. Shift2Rail JU has proved, in particular, to be able to strike the perfect balance between long-term projects and the achievement of short-term results, thereby supporting the Shift2Rail approach of coupling strategic long-term R&I funding with the pursuit of quick-wins.

Two related projects, developed through the Shift2Rail JU, can be mentioned as good examples of R&I contributing in a decisive way to the railways' decarbonisation objectives.

- OPEUS (open call project): The OPEUS concept is based on the need to understand and measure the energy being used by each of the relevant components of the rail system and in particular the vehicle. OPEUS is to develop a simulation methodology and accompanying modelling tool to evaluate, improve and optimise the energy consumption of rail systems with a particular focus on in-vehicle innovation – e.g. automatic drive; battery-powered train.
- FINE1 (funding partners project): The FINE 1 project aims to reduce operational costs of railways by a reduction of energy use and noise related to rail traffic. The reduction of energy use for rail vehicles will lead to reduced green-house gas emissions, also with most rail transport powered with electricity. Further, reducing energy use will lower the life cycle cost and the costs of vehicle operation.

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The three Associations strongly believe that this collaborative-research model of Shift2Rail JU shall be continued within the next Horizon Europe Framework Programme 2021 – 2027. This has been, indeed, a very successful model with its focus on excellence and collaboration across a variety of R&I players ranging from industry (large companies, SMEs, start-ups), infrastructure managers, railway undertakings, academia (universities & science academies) to public actors (regions & local actors), throughout Member States.

Finally, to overcome the considerable gap (“valley of death”) between innovation and deployment, additional focus should be placed within programs such as Connecting Europe Facility on supporting testing and the first large scale applications of innovations.

Recommendations

- The support for research and innovation in the rail sector shall be continued and intensified – tackling the first steps of market deployment.
- The Shift2Rail Joint Undertaking programme shall be extended in the forthcoming Horizon Europe Framework Programme 2021 – 2027 with a larger adequate budget.

5. The role of rail in low-emission urban and sub-urban mobility strategies

Urbanisation represents one of the most staggering mega-trends over the next decades, all over the World. The EU is no exception, with almost three quarters of the European population currently living in urban areas in 2015, and it could rise to just over 80 % by 2050. As a matter of fact, urbanisation – combined with societal changes such as an ageing population – deeply affects mobility as cities and their surroundings become major hubs for education, innovation and knowledge-based economies. Accordingly, the challenge for public transport is to adapt to the mobility landscape of steadily denser cities and congested suburban areas. Failing to respond to this challenge would risk worsening considerably the issue of greenhouse gases emissions, as cities and their surrounding areas become major source of pollution.

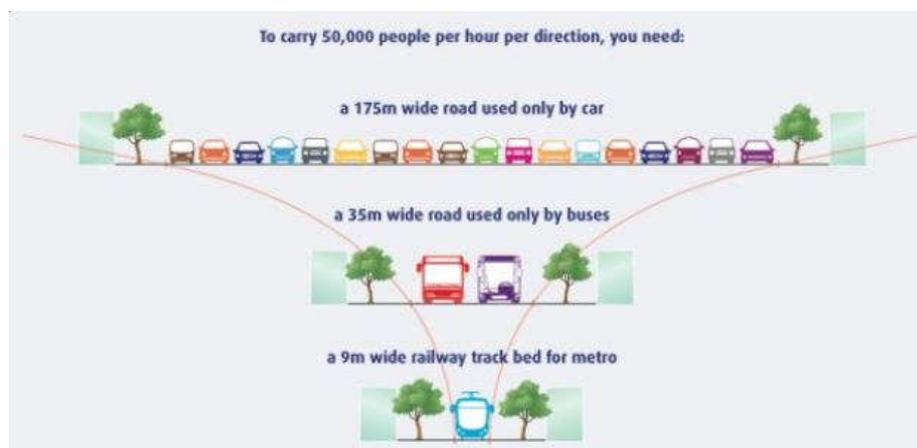
Against this backdrop, the creation of new mobility paradigms, capable of delivering high-quality urban and sub-urban mobility services to people in their day-to-day lives, is required. Arguably, no mode of transport alone, no matter how technologically advanced or attractive, will be able to stand alone and deliver against the urbanisation challenge. Digital-based solutions are already paving the ground for new tools and services based on a seamless door-to-door mobility chain by means of integrated multimodal transport systems.

The role of rail, in this context, assumes a particular significance. Urban/Sub-urban rail-bound solutions (metro tramways, tram-trains, suburban trains) appear as the most efficient public transport services, notably when it comes to:

- Capacity: rail will remain the most effective mode of mass transport to move large number of users over a large given distance – contributing decisively in reducing congestion.
- Land use: cost-efficient tram systems as well as guided metro systems are much more efficient in terms of land use, which is a rare resource in dense cities, in Europe and worldwide.

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Figure 4: efficiency of urban rail in relation to land use.



- Low-emission: the full deployment of electric vehicles (EVs) and connected & automated vehicles (CAVs) would still take several years, a time-horizon which does not suit the urgency of fixing of climate change and pollution. On the contrary, fostering rail-bound solutions provide immediate and proven answers to those challenges – tackling urban pollution and air quality. Rail also plays a key role in cities who introduce low emissions zone.
- Safety: rail is the safest mode of land transport, with only a tiny fraction of occurred accidents compared to road transport – for which 34% of the road accidents occur in urban areas⁸.

Following this further, rail is a key pillar in smart urban planning processes and infrastructure development. In this regard, railway stations can serve as effective multimodal interfaces in the urban and suburban mobility chains – linking regional and underground rail services with other urban modes of transport such as trams, busses and also car/bike sharing systems. Furthermore, investments in bike parking at stations will ensure a ‘dual fit’: zero emissions and less congestion. Finally, the introduction of new rail lines is – compared to “flexible” bus lines – usually considered as a strong commitment to long-term infrastructure development by the involved business and housing stakeholders.

Granted – and without forgetting additional railway assets in terms of comfort and safety – rail appear as the backbone system-integrator of multimodal transport paradigms in urban areas and beyond.

Recommendations

- Urban rail shall remain at the heart of European resource-efficient urban mobility policies.
- Urban rail shall be promoted as backbone of sustainable mobility fostering its interconnectivity with other low-carbon modes.

⁸https://ec.europa.eu/eurostat/statisticsexplained/index.php/Archive:Transport_accident_statistics#Railway_accident_statistics

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