ANNEX to GB decision n°18/2024

Phasing-out plan of the Europe's Rail Joint Undertaking

Contents

1. EXECUTIVE SUMMARY AND INTRODUCTION

1.1. A brief history of the JU including its predecessors

The Europe's Rail Joint Undertaking ("EU-Rail") was established by the Council Regulation (EU) 2021/2085 of 19 November 2021 establishing the Joint Undertakings under Horizon Europe and repealing Regulations (EC) No 219/2007, (EU) No 557/2014, (EU) No 558/2014, (EU) No 559/2014, (EU) No 560/2014, (EU) No 561/2014 and (EU) No 642/2014 ("the Single Basic Act" or "the SBA"), which entered into force on 30 November 2021. In accordance with Article 174(6) of the SBA, EU-Rail is the legal and universal successor in respect of all contracts, including employment contracts and grant agreements, liabilities and acquired property of the Shift2Rail Joint Undertaking ("the S2R JU") which it replaced and succeeded. The S2R JU was established on 7 July 2014 by the Council Regulation (EU) No 642/2014 of 16 June 2014 establishing the Shift2Rail Joint Undertaking as a public-private partnership under the Horizon 2020 Framework Programme.

EU-Rail is an autonomous body with its own legal personality having its seat located in Brussels, Belgium. It is an institutionalised European partnership as per Article 187 of the Treaty on the Functioning of the European Union dedicated to managing and coordinating mission-oriented Research and Innovation ("R&I") activities for a major transformation in rail systems in Europe.

In accordance with article 87(1) of the SBA, the members of EU-Rail are the European Union, represented by the European Commission, and 25 Private Members. As per Article 2(5) of the SBA, "Private Member" means any legal entity established under public or private law that is a member of a joint undertaking other than the Union, participating states or international organisations. The Private Members of EU-Rail were selected via an open and transparent process, started with an "invitation to manifest the interest to become Candidate Founding Member of the Transforming Europe's Rail System European Partnership" on 13 August 2020 and concluded with the listing of 25 entities retained as Founding Members in Annex II of the SBA. The Private Members of EU-Rail signed a Letter of Commitment in accordance with the provisions of the SBA to deliver the contributions established in its Article 89. EU-Rail launched by end of the first half of 2024 a call for expression of interest with a view to selecting Associated Members in accordance with Article 7 of the SBA, after having performed an in-depth review of the areas where such type of membership would bring added value to the R&I Programme.

The design and implementation of EU-Rail under Horizon Europe, and of its predecessor S2R under Horizon 2020, was structured around the general objectives of the European Framework Programme for Research and Innovation. They were translated into specific and operational objectives, which have been or are successfully being met.

The Joint Undertaking structure provides a vital and unique approach, successfully delivering a coordinated European rail research programme replacing the previous uncoordinated and fragmented approach. The Joint Undertaking approach allows the future of rail to be shaped by EU policy goals, enhancing the rail sector's role in the transport system due to its environmental, land use, energy, and safety advantages.

As evidence of this, the S2R program successfully achieved its targets across various rail segments, including high-speed, mainline/regional, urban, and freight applications. Key accomplishments include improvements that can deliver:

- 20-41% reduction in lifecycle costs,
- 58-96% increase in capacity, and
- 39-57% improvement in reliability and punctuality.

Building up on those results, the EU-Rail identified five areas of priority in its Master Plan: 1) European rail traffic management and supporting rail's key role in a multimodal transport system 2) Digital and automated train operations 3) Sustainable and digital assets 4) Competitive digital green rail freight 5) Smart solutions for low density traffic lines (cost-efficient regional lines).

Flagship Projects for each area of priority have been established within the Innovation Pillar since late 2022 and are now well underway. Additionally, the System Pillar acts as the "generic system integrator" for EU-Rail, and by developing and providing inputs for specifications and standards to the European Commission and the rail sector, ensures European wide adoption.

EU-Rail intensely worked to achieve its full commitment of the budget appropriations related to HE for the operational activities until 2024, demonstrating that the partnership has been able to successfully engage the railway sector to provide significant resource commitment to progress in achieving its objectives.

Overall, EU-Rail and S2R before it foster innovation into the European rail sector by reducing fragmentation and aligning R&I activities with broader EU policy goals, thereby supporting the creation of a competitive and integrated European railway system.

1.2. **A brief outline of the policy context of the focus area of the JU**

EU-Rail works towards the twin green and digital transition of Europe.

The European Green Deal[1] objective is to reach climate neutrality by 2050, the Fit for 55 package[2] sets medium-term greenhouse gas emissions reduction objectives, and the Digital Decade sets the path to bring Europe to the forefront of digitalisation and automation.

The Sustainable and Smart Mobility Strategy articulates the pathways towards digitalising and greening the transport sector and sets specific milestones for the railway sector. In particular it outlines what EU-Rail JU can contribute to:

- Making interurban and urban mobility more sustainable and healthier
- Greening freight transport
- Making connected and automated multimodal mobility a reality

[1] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
[2] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en

The railway sector will contribute to those objectives by increasing its capacity for passenger and goods transport, enabling an increase in the use of rail transport, and by reducing further the greenhouse gas emissions of the railway sector itself.

At the same time, the Industrial Strategy aims at enhancing Europe's industrial competitiveness, especially in sectors contributing to both green and digital transitions.

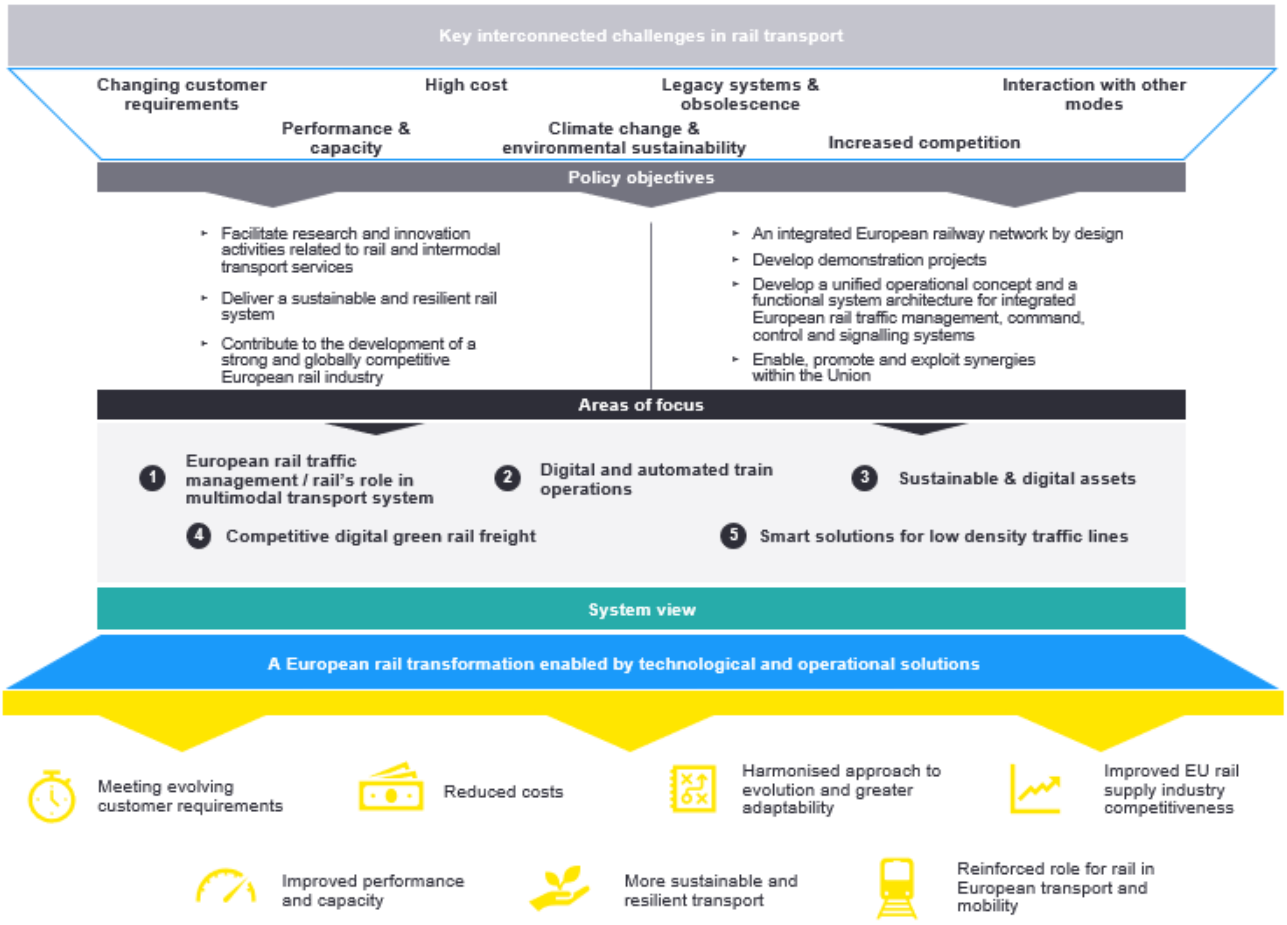
These Union policy goals are a major reason for the railway sector to undergo a significant transformation - increasing its capacity for passenger and goods transport, enabling an increase in the use of rail transport, and reducing further the greenhouse gas emissions of the railway sector itself.

The main objective for Europe's Rail as set out in the Single Basic Act is to *deliver a high capacity integrated European railway network by eliminating barriers to interoperability and providing solutions for full integration, covering traffic management, vehicles, infrastructure and services, aiming to achieve faster uptake and deployment of projects and innovations. That should exploit the huge potential for digitalisation and automation to reduce rail's costs, increase its capacity and enhance its flexibility and reliability, and should be based upon a solid reference functional system architecture shared by the sector, in coordination with the European Union Agency for Railways*.

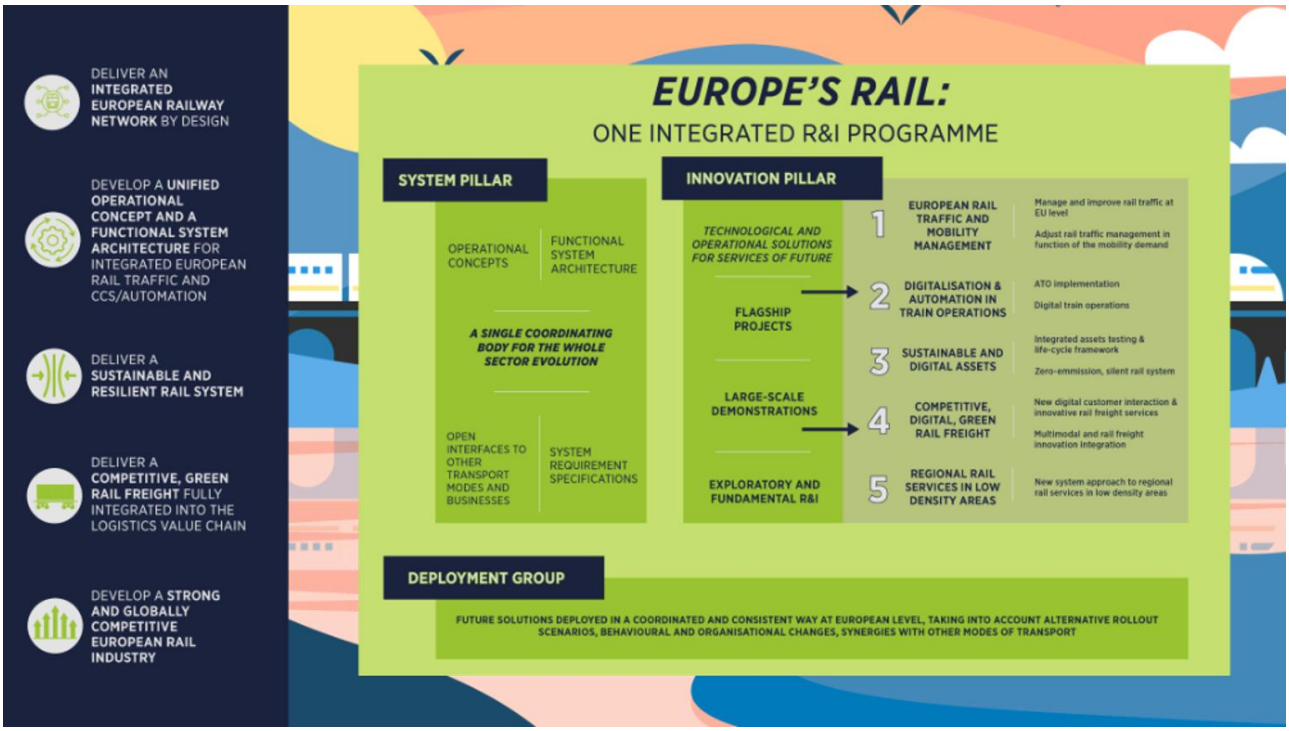
To this end, EU-Rail ensures a close collaboration with the European Union Agency[3] for Railways (ERA) with regard to the implementation of EU-Rail's Master Plan, in all areas listed in Article 98 of its SBA.

Five areas of priority have been identified in the EU-Rail Master Plan to address key interconnected challenges in rail transport and to meet at the same time the Union policy objectives, These are expressed in the figure below:

[3] The objectives, the mission and the types of acts of the European Union Agency for Railways are set out in Regulation (EU) 2016/796



EU-Rail is set up around one integrated Research and Innovation Programme based on a system view. The Programme is delivered by two pillars - the System Pillar and the Innovation Pillar - and complemented by the activities of a Deployment Group, all together covering the full life cycle of R&I from blue sky to pre-deployment and pre-industrialisation processes.



1.3. **<u>An outline of the JU's objectives and contribution to broader strategic EU priorities.</u>**

In addition to the General and Specific Objectives established in Chapter 1 of the SBA, EU-Rail is entrusted with the following:

General Objectives

(a) contribute towards the achievement of the Single European Railway Area;

(b) ensure a fast transition to more attractive, user-friendly, competitive, affordable, easy to maintain, efficient and sustainable European rail system, integrated into the wider mobility system;

(c) support the development of a strong and globally competitive European rail industry.

Specific objectives

(a) facilitate research and innovation activities to deliver an integrated European railway network by design, eliminating barriers to interoperability and providing solutions for full integration, covering traffic management, vehicles, infrastructure also including integration with non-standard national gauges, such as 1520, 1000 or 1668 mm railway, and services, and providing the best answer to the needs of passengers and businesses, accelerating uptake of innovative solutions to support the Single European Railway Area, while increasing capacity and reliability and decreasing costs of railway transport;

(b) deliver a sustainable and resilient rail system: by developing a zero-emission, silent rail system and climate resilient infrastructure, applying circular economy to the rail sector, piloting the use of

innovative processes, technologies, designs and materials in the full life cycle of rail systems and developing other innovative solutions to guided surface transport;

(c) develop through its System Pillar a unified operational concept and a functional, safe and secure system architecture, with due consideration of cyber-security aspects, focused on the European railway network to which Directive 2016/797 applies, for integrated European rail traffic management, command, control and signalling systems, including automated train operation which shall ensure that research and innovation is targeted on commonly agreed and shared customer requirements and operational needs, and is open to evolution;

(d) facilitate research and innovation activities related to rail freight and intermodal transport services to deliver a competitive green rail freight fully integrated into the logistic value chain, with automation and digitalisation of freight rail at the core;

(e) develop demonstration projects in interested member states;

(f) contribute to the development of a strong and globally competitive European rail industry;

(g) enable, promote and exploit synergies with other Union policies, programmes, initiatives, instruments or funds in order to maximise its impact and added value.

EU-Rail is significantly contributing to broader strategic EU priorities by addressing key challenges in the rail sector and aligning with the EU's overarching goals. The partnership R&I programme focus on delivering:

- Climate Change and Environmental Sustainability: By promoting sustainable and interoperable rail solutions, EU-Rail supports the EU Green Deal's objectives to reduce transport emissions and encourage a modal shift towards greener transportation options.
- Competitiveness and Innovation: The R&I programme foster innovation within the rail industry, enhancing its competitiveness on a global scale. This aligns with the EU's goal of maintaining a competitive transport sector amidst increasing global competition.
- Transport Integration and Clean Mobility: EU-Rail contributes to the EU's Smart and Sustainable Mobility Strategy by improving rail digital connectivity and integration with other transport modes, supporting the development of a seamless, multimodal transport system.
- Economic Growth and Employment: By facilitating through R&I the networking among rail innovators and synergies with other sectors, new business opportunities and improved productivity emerges. The partnership therefore contributes to economic growth and job creation, aligning with the EU's objectives to fuel growth and employment.
- Digitalization and Modernisation: The focus on digital and automated train operations helps modernize the rail system, making it more efficient and resilient, in line with the EU goals for digital transformation across sectors.

The impact assessment study for Institutionalised European Partnerships[4] under Horizon Europe indicates that the application of the R&I output from EU-Rail would be able to significantly divert more traffic to rail from other, less environmentally friendly, modes. The expected reduction is between 2.5 and 4 million tonnes in 2031. This impact could be expected to increase if the competitiveness of rail services continues to improve beyond the period of Horizon Europe, hence making a substantial contribution to the achievement of the Green Deal objectives.

Additionally, the Interim Evaluation Support Study[5] for EU-Rail indicates that "EU-Rail and its predecessor have been effective in advancing R&I activities and demonstrations, supporting technologies and solutions for a sustainable, competitive, time-driven, cost-effective, high-performing, and digital rail system. Notable achievements like the digital automatic coupler (DAC) and important advances in the field of European Rail Traffic Management System (ERTMS) and related automated train operations capabilities have been an essential foundation for automation services. Moreover, the capacity of both JU's to convene, fund, and coordinate large-scale R&I demonstration activities is one of the most relevant added values. Additionally, the JU has created an important platform for knowledge-sharing and collaboration for infrastructure managers, operators, suppliers, developers, policy makers and other key stakeholders, supporting the coordination of efforts at the national and European level.".

Overall, EU-Rail plays a crucial role in advancing the EU's strategic priorities by fostering a sustainable, competitive, and integrated rail system that supports broader economic, environmental, and social goals.

[4] https://op.europa.eu/en/publication-detail/-/publication/8e98b39a-8154-11eb-9ac9-01aa75ed71a1
[5] https://op.europa.eu/en/publication-detail/-/publication/e6cc1f91-6421-11ef-a8ba-01aa75ed71a1/language-en#

2. SHORT AND LONG-TERM TARGETS

As set out in section 1.2, EU-Rail works towards the twin green and digital transition of Europe, including reaching climate neutrality by 2050, and within the Sustainable and Smart Mobility Strategy, specific targets for rail:

- By 2030:
    - Doubling of high-speed rail traffic
    - Rail traffic increase by 50%
    - Large-scale deployment of automated mobility
    - Scheduled collective travel under 50km should be carbon neutral within the EU
- By 2050:
    - Tripling of high-speed rail traffic; and
    - Doubling of rail freight traffic.

EU-Rail is a key enabler for all of these short and long-term targets.

EU-Rail and S2R have fundamentally changed the landscape of European rail research and innovation, achieving a coordinated partnership of the industry with the Union delivering European solutions that is transforming the European rail system, benefiting passengers and freight customers in Europe and strengthening European industry competitiveness. This is a notable success because rail is a long-standing network industry, which is fragmented structurally (between operators and infrastructure providers) and geographically. Historically, each European railway developed standards and technologies independently of its neighbours.

The JU provides a vital and unique structure in which all these issues can be addressed cooperatively by the EU rail sector and its suppliers working together in a coordinated fashion. This enables European approaches to be found enabling the power of the internal single market versus bespoke national solutions.

Underpinning the activities of EU-Rail is the longer-term target to contribute to the realization of the Single European Railway Area (SERA), which requires a whole system approach (provided by the System Pillar) within which to carry out the research and innovation (within the Innovation Pillar).

The System Pillar provides governance, resources, and outputs to support a coherent and coordinated approach to deciding the evolution of the rail system. Such an approach has not been achieved in rail before but is vital to support European wide implementation of commonly agreed R&I targets based upon commonly shared customer requirements and operational needs. The System Pillar is now established as the one stop shop where the sector, European Commission, and ERA can work together and commonly agree the choices necessary to work towards the SERA. Until the SERA is fully achieved the work performed by the System Pillar remains vital.

The main outputs of the System Pillar are specifications and standards. These outputs underpin SERA and interoperability. Specifically for the Technical Specifications for Interoperability (TSIs), EU-RAIL, through the System Pillar, aligns the European research and innovation approach with the regulatory approach by providing mature and complete specifications as inputs for TSIs drafting in line with an overall strategic view.

Further specific targets after EU-Rail needs to be set, covering the other subsystems and ensuring the current architectural elements are correctly implemented, notably following the work of the EU-Rail Deployment Group.

EU-Rail's way of innovative working guarantees a strong focus on prototyping, large-scale demonstrations and increases collaboration by ensuring the openness of its initiatives. By setting up the EU-Rail Deployment Group as an open stakeholders' group, the target of faster and coordinated implementations can be achieved, so that innovation cycles are optimised, and impactful results delivered.

The EU-Rail Deployment Group, established under the Single Basic Act, is a crucial foundation for achieving more acceleration to implementing the outcomes of the Innovation and System pillar. As a C-level stakeholder group, it advises the EU-Rail Governing Board on the market uptake of rail innovation developments and support their deployment. Its activities thus form a bridge between the research and innovation process and the coordinated implementation through recommendations for deployment in the rail system. The topics covered include elements normally outside research and innovation activities such as funding availably and political buy in.

The EU-Rail Deployment Group examines the possible implementation at EU level of a developed European solution and provides recommendations for its deployment in the rail network, providing therefore a set of long-term targets.

Two important initial examples are:

- The deployment of the Digital Automatic Coupler, a key enabler to bring the rail freight operations into the 21st century and the future-proof in view of automation and digitalization progresses. The Greening Freight Transport communication6 of the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, the deployment of digital automatic couplings (DAC) technology, supported by the R&I of EU-Rail, is highlighted as a game-changer for European rail freight. The Commission is looking forward to developing a comprehensive migration strategy to coordinate deployment, with the help of EU-Rail. This is currently enabled by the European DAC Delivery Programme[7] which already started by GB endorsement in 2020 voicing the need and request on behalf of the railway sector to bring together the rail sector beyond the membership, including migration planning, towards the deployment of a European DAC solution built on open and transparent standard specifications. The current targets foreseen:

[6] https://transport.ec.europa.eu/system/files/2023-07/COM_2023_440.pdf
[7] https://rail-research.europa.eu/european-dac-delivery-programme/

- The finalization of the basic technological package supported by EU-Rail R&I by 2026
- The start of pioneer trains over the EU network in commercial environment for a period of about two years, until 2028, supported by Connecting Europe Facilities
- Pending results from the pioneer trains, the deployment at EU scale, including procurement, in parallel to the ramp-up of the next EU Multi-Annual Financial Framework and to be considered as a possible (or part of) Important Projects of Common Interest (IPCEI) to boost EU competitiveness.

- The deployment of the next European rail communication system (FRMCS). EU-Rail is significantly supporting its smooth implementation due to the foreseen phase-out of the GSM-R system in 2030. GSM-R (based on 2G technology) is today the communication part of ERTMS applied by EU Regulation (TSI) over the European network (over more than 130.000 km of tracks) and designed in the 1990s. EU-Rail will support the European Union Agency[8] for Railways with the needed input[9] for the update of the TSI towards a new system (based on 5G and upgradable), in particular through performing a test campaign of those specifications in the rail network, in collaboration with The Smart Networks and Services Joint Undertaking (SNS JU), targeting the successive error corrections and conclusion in a V3 final specifications.

The Innovation Pillar through the Flagship Areas directly provides the solutions to support the achievement of the European policy targets. The Research & Innovation activities under the IP are aligned with the areas of priority defined within the EU Rail Master Plan and implemented in the Innovation pillar by:

- European rail traffic management and supporting rail's key role in a multimodal transport system
- Digital and Automated Train Operations
- Sustainable and Digital Assets
- Competitive Digital Green Rail Freight
- Smart Solutions for Low Density Traffic Lines (cost-efficient regional railways)
- Transversal topics: data and digital enablers
- Exploratory research and paradigm shifts

For example, the next generation of rail Traffic Management Systems will not only connect EU Countries together in managing international paths optimising rail journeys, network capacity and minimising disruptions, but also different transport modes towards a more and more demand-based

[8] ERA is the EU system authority for ERTMS in accordance with Regulation (EU) 2016/796

[9] An input which is to be used, maintained and further developed not only by the European Union Agency for Railways but also by the EU legislator.

mobility/traffic[10]. As part of the Greening Freight Package the European Commission published a proposal for a Regulation on the use of railway infrastructure capacity in the Single European Railway Area[11], where the rail Infrastructure Managers are called on ensuring alignment, in particular regarding digitalisation of capacity and traffic management, with the work of the Europe's Rail Joint Undertaking underpinning these improvements. Those are other important changes into the rail system that would need in the year to come an important level of coordination and investments synchronisation with the automation technology developed in EU-Rail for example over the next decade.

Additional R&I activities are also necessary to reach the above long-term targets of the European Union for Sustainable Transport and Mobility.

The rail sector needs to capitalise on the advances made in the communication, digital, energy, and in general all domains to increase its competitiveness and ensure safe and secure connections across Europe for its citizens and businesses alike.

New opportunities derived from the successful outcomes of the EU-Rail R&I activities would also require a system thinking and network coordination of implementation at EU level.

To cite a few examples:

- Reduction in lifecycle costs. In order to strengthen rail in Europe, and in particular to meet the SSMS goals, for example, tripling the current High Speed Rail network by 2050, costs to deploy and run rail must reduce in relative terms. This is far from a trivial approach and requires continued innovation (for example to increase automation), a system approach to develop common European approaches, standards, specifications, and a detailed consideration of deployment.

- The application of satellite technology in rail has the potential to transfer the cost of maintenance away from the rail infrastructure, further optimising its costs and relying on a secure European communication infrastructure IRIS^2 (Infrastructure for Resilience, Interconnectivity and Security by Satellite) of which constellation is also planned to be operational as from 2027 – building up on the results for train positioning from the EU-Rail project (involving in the Innovation Pillar the Flagship Project 2[12], the System Pillar and

[10] EU-Rail Flagship Project 1 is working for an increased resilience of a connected 'real time' rail network is at the core of the project, looking at the integration of Traffic Management Systems (TMS) and processes, including cross-border traffic management, as well as improving resilience and efficiency of disruption management at European level. Linking TMS to ATO/C-DAS for optimised operations is researched with a focus on automated decisions and decision support for traffic management optimisation. The project outputs include the integration of rail traffic within multimodal door-to-door mobility and services for inclusive rail-based mobility and anticipating demand, leading to improved resource utilisation.

[11] https://transport.ec.europa.eu/system/files/2023-07/COM_2023_443_0.pdf

[12] EU-Rail Flagship Project 2 is working to achieve digital and automated rail operations up to fully autonomous train operations. It works to improve and reduce the cost of localisation of the train. Eight demonstrators are being prepared to be delivered by 2025. Cooperation is ongoing with EUSPA and ESA to provide the necessary augmentation system according to jointly agreed railway requirements. Specifications of fully automated trains ATO GoA 3-4 will be delivered in 2032. In 2024, first demonstrators have proven the concept of remote-controlled trams and locomotive, for most efficient shunting operations. Railways need to improve their communication system. Alongside the support for the testing and validation of FRMCS, EU-RAIL delivers key building blocks for the Gigabit train. Additionally, it develops a proof-of-concepts for virtual coupling, self-driving wagons, autonomous path allocation, and validation and certification. It finally focuses on ensuring the cybersecurity system viability of the use of those innovative digital solutions.

ERA) started in 2024 with EUSPA[13] , and ESA[14]. The related service GovSatCom could be of use particularly for secondary lines. This can also be seen as coupled with the rail adoption of future 6G technologies, building on synergies EU-Rail has already created with the SNS JU in charge of developing such technical solutions for Europe, with adaption of the rail on-board system to benefit of satellite communication capabilities directly from the 6G features.

- The development of innovative solutions contributing to the reinforcing the network of smart multimodal terminals and ports. This requires exploring alternative business models to include first and last mile e.g. by using urban rail. Additionally, rural, sub-urban and urban areas are expected to provide growth potential. Multimodality is crucial to enhance flexibility to rail services, together with effective land planning and a systematic approach and on-demand transport based on the ground-breaking work done in EU-Rail on the next generation of Traffic Management Systems, including in collaboration with SESAR 3 JU on the connection between air and rail traffic management. Overall driving the R&I towards a user-oriented approach, where rail retains its central role of sustainable transport and mobility but cooperates and works with other transport modes to ensure attractive, innovative and tailor-made rail services. Further innovative solutions are developed to ensure that rural areas with secondary rail lines benefit of an attractive public mobility service. Specific solutions as unattended and on-demand operation are indispensable to provide affordable mobility here. Further innovative solutions as e.g. virtual coupling and autonomous route setting are developed to connect those lines efficiently to the high-demand network.

- The wide application and further enhancement of the initially developed EU-Rail digital services and rail data space in the Mobility Data Space by standardising a catalogue for rail data with ERA work to enable secure sharing of critical information, overcoming challenges of diverse and incompatible systems, by ensuring that data is semantically described so it can be shared securely and efficiently among different stakeholders, fostering collaboration and trust, by utilizing digital twins for better maintenance planning, predicting failures before they occur, which increases train reliability and safety for travellers, by implementing predictive maintenance strategies to reduce service interruptions and improve overall network efficiency, by using accurate data and digital models to optimize train schedules or resource allocations, reducing delays and improving punctuality for passengers. Finally, digital engineering and planning is developed to speed up migration and roll-out of innovations.

Additionally, clear drives for future R&I cooperation and activities building up on the results of EU-Rail and beyond the current Research Framework Programme, have been identified with three strategic research priorities by the sector in the Rail Research and Innovation Agenda of ERRAC, namely:

1. Resilience, sustainability and competitiveness
2. Understanding systems interdependencies
3. People-centric railways

[13] https://www.euspa.europa.eu/
[14] https://www.esa.int/

3. STRATEGIC ALIGNMENT

The Europe's Rail Joint Undertaking is an essential component of the European Union's strategy to enhance its rail transport system, as it is crucial for aligning the rail sector with the EU's broader policy goals, such as the European Green Deal, Fit for 55, and the Sustainable and Smart Mobility Strategy, while also contributing to the United Nations' Sustainable Development Goals.

The reason for EU-Rail's existence is deeply rooted in its strategic alignment with EU transport and competitiveness policies as it plays a crucial role in contributing to creating the Single European Railway Area, complementing the role and objective[15] of the European Union Agency for Railways, as well as enhancing the competitiveness of the European rail supply industry on a global scale by fostering innovation and creating new market opportunities.

Transport resilience needs to be hedged against disruptive events, like a pandemic or geopolitical tensions. The illegal invasion of Ukraine by Russia still has a huge impact on the transport infrastructure by affecting supply chains and limiting European citizens mobility. Considering that Europe seeks alternatives to Russian energy supply, the rail transport's role in the efficient movement of goods and people becomes even more critical to ensure connectivity and security, pushing for the need of a resilient and autonomous European rail system. For this reason, it appears fundamental to enhance rail networks and the ability of rail to provide a quality standard service across Europe and beyond, something that EU-Rail has demonstrated to support in a coordinated way with its partnership framework of high TRL R&I.

EU-Rail manages innovation in a new integrated system approach, which is essential for achieving SERA. This approach requires coordination across various stakeholders to ensure a unified operational concept and a functional, secure system architecture. Such a comprehensive and coordinated effort on innovation requires a deep knowledge on this latter, and agile approach towards change management which is beyond the capacity of individual actors, local initiatives, or other existing EU bodies.

Previously, research and innovation activities within the EU were not coordinated, leading to significant duplications and projects not necessarily focusing on common goals. This, however, has changed, and the JU structure is accepted as the focal point for European R&I with coordination and alignment at national and regional level. This latter could also be further enhanced based on specific EU policies.

Because the rail sector is a complex network industry, deep coordination and alignment of public and private R&I funding, including the integration of different actors, are also essential.

The EU-Rail programme, as compared to interventions carried out at regional or national levels, brings multiple advantages by providing:

- A long-term strategy for rail-related R&I, with research and development activity aligned with European policy objectives for the rail sector (STIP & TSI and standardisation requests) that can be complemented by national and regional actions.

[15] ERA's objectives are set out in Article 2 Regulation (EU) 2016/796

- A higher level of overall R&I invested, not least because of a commitment of financial and in-kind resources from rail industry organisations who are better able to engage under a legally binding framework governing the allocation of resources; it accelerates innovation and attracts private investments.
- An EU-wide scope, allowing for interoperability of the rail system that are then applied at local level and the needed operational harmonisation, which require coordination beyond the national and regional level. Harmonized concepts for vehicles and signaling for regional and local lines complement the TSI which will help to speed-up revitalization of those lines by cost-efficient larger series.
- Strengthened rail stakeholders' networks, including linking universities and research-based organisations with actors within the rail industry across EU Member States.
- Established stable platform for engagement, supported by a dedicated administrative structure, stimulate ideas for research and more opportunities for the industry to help shape the research agenda in line with market needs, with different stakeholders competing to influence the direction of research and identify concrete opportunities for further innovation.
- Coordination of rail R&I to avoid parallel developments by individual stakeholders (the EU here acts as a catalyst to efficiently deliver rail research).
- Standardised EU solutions, brought together by the actors in EU-Rail innovations, so that services for passengers and freight customers are improved and costs decrease for the entire EU network.
- Higher potential implementation of successful high TRL results thanks to large-scale research and innovation activities at the European and national level, leading to the implementation of the Single European Railway Area.
- Synergies and cooperations with other relevant European, national, and regional programmes and activities can be pursued efficiently with a single point of contact.

In summary, Europe's Rail takes an integrated approach that enables low TRL innovations to be taken through to deployment. This is made possible by a long-term agenda and a collaborative approach between operators, industry and academia. This is particularly important for innovations that require a European approach, as already demonstrated with the digital automatic coupling and FRMCS. An implementation e.g. of ATO following a common European architecture in the 2030s will require just such an approach.

EU-RAIL also looks to create synergies with other organisations. Strategic alignment and cooperation are key for the European rail sector to maintain its global leading role and increase its strategic sovereignty by integrating innovations from other industries. EU-Rail is therefore actively seeking synergies between European partnerships and has already started coordination activities that were enable thanks to the verticality of each programme and the ability of EU-Rail to provide an end-to-end approach to its R&I. For example, with SESAR 3 in rail-air traffic management, improving door-to-door mobility, or with SNS JU for testing and operational validation of the next EU rail communication system, or collaboration with other initiatives focusing on topics such as multi-modal

transportation, vehicle automation, decarbonisation, and alternative fuels. The Joint Undertaking is a platform that allows future continued research alignment (for implementation and therefore impact) for the rail sector on digital transformation, artificial intelligence, cyber-security, and high-performance computing, with synergies with EUSPA (and ESA) already initiated and with future European partnership(s) dealing with computing power and chips.

The ability to respond with concrete measures to requests of decision makers is a key task. As it has been the role of EU-Rail in enabling the European Parliament pilot project – IRS Smart Cities project on new railway station concept for green and socially inclusive smart cities, integrating this latter in a wider integrated Programme and eco-system with key strategic rail stakeholders committed to the implementation of successful results at EU level, therefore enhancing the possibility of impact. Such specific construct does not seem achievable in case of disperse, unfocused or redistributed tasks and resources.

From an organisational perspective, EU-RAIL has led the Accounting services in the context of the Back Office Arrangements (BOA) with the other JUs is an alignment element (of tasks redistributed towards EU-Rail) that could be envisaged for a future similar construct should the phasing-out would result in a creation of a new JU based on the current EU-Rail capability.

Taking a strategic outlook on the work post-EU-Rail, additional elements of directionality, requiring other types of alignments such as with deployment actions and funds at national and EU level, could emerge as rail transport contributes significantly to the fundamental freedoms of the Single Market (free movement of goods, services, people and capitals) and provides in several European regions a fundamental social service (connecting remote locations thanks to an existing wide network in Europe). The implementation at network level of innovations that are strategic for Europe requires a certain level of coordination and a strategic partnership able to leverage private capitals and at the same time deliver upon Union's goals. There is no reason to think that building up on the output of EU-Rail cannot support further the policy goals, with in particular the instrumental support of a joint undertaking at a different, more ambitious, scale and scope with new and updated targets in aligning EU, national, and private policy agendas.

4. FINANCIAL SUSTAINABILITY

4.1. **Funding sources:**

EU-Rail Joint Undertaking has been designed to bring an ambitious R&I Programme at TRL 7/8, supporting the market take up with the alignment of regulation and standardisation activities as well as providing recommendations towards future deployment actions that requires coordination and investments at EU level.

The R&I Programme of EU-Rail is integrated and multi-annual, therefore not being a series of independent projects, it is expected to bring the biggest impact when approached in a systemic and coordinated manner until the end of its implementation. Reducing the EU funding towards the end of the life of the JU would result in a potential fragmentation of results and with no leverage over the private financing.

EU-Rail is focusing its activities on ensuring coherence and complementarity with relevant national and European investment programmes, such as Connecting Europe Facilities, European Structural and Investment Funds, Innovation Funds and the Recovery and Resilience Facility, 15 % of the latter will be invested in national railway systems. To this end, the JU seeks dialogue with local, regional and national stakeholders in order to coordinate and complement the research and innovation activities carried out, with the State Representative Group playing a key role.

Depending on the type of solutions that should be deployed in the rail network, different optimal funding sources could be identified. As a pure speculation support from the European Investment Bank in the form of loans to the rail sector, coupled with future Connecting Europe Facilities funds, could for example support the ETMSERTMS innovations developed in EU-Rail and linked to TSI, or for Digital Automatic Couplings, or for Traffic Management Systems. EU support for coordination of actions may also be needed, such as in case of the harmonised implementation of rail data spaces or even procurement action such as DAC that would benefit of an EU innovative scheme on procurement. Results derived from the work achieved in the Regional low-cost solutions may benefit from European Structural and Investment Funds as well as national investments.

Currently, without indication on the possible legal arrangement on a potential continuation of the activities of EU-Rail, nor having a view of the EU priorities reflected in the next Multi-Annual Financial Framework (MFF) it is not possible to pre-determine which funding source outside of any private investments would be possible or more effective.

It can be although already advanced that potential future funding source could be brought by the current or future members of EU-Rail or its successor, technological suppliers with a vested interest in rail solutions such as communication, satellite, digitalisation, or engineering companies, the EU Members States or the countries associated to Horizon Europe and other countries having rail systems.

The transformation of the European rail system to a genuine European approach is a massive long-term project, but it requires a European lead. If in the future there is no JU framework to support an integrated and coordinated approach to rail research, then it seems clear that progress towards the SERA and its associated benefits will be slowed or reversed. This includes the development of

harmonised inputs to TSIs and standards. Without such funding and support current and future specifications would not be maintained or developed, additionally in an efficient manner. Additionally, the competitiveness of the European Rail industry will be seriously undermined by much greater public investment in research and uptake of innovation in other continents and would significantly hinder overall European policy goals.

The provision of specific support to individual projects could even be counterproductive, leading as in the past, to fragmented delivery and regional and national approaches – driving up costs and lowering the European rail industry competitiveness at worldwide level.

4.2. **Revenue streams:**

As such this Joint Undertaking has not been designed to have revenue streams, such as the provision of certification tasks over the product developed following the R&I in EU-Rail, nor the provision of consultancy services which appear also to be a conflict of interest with the independent and transparent role of the JU over the allocation of EU funds to R&I activities.

Launching those type of activities may also result in a lack of JU focus.

4.3. **Long-term commitment of the members other than the Union:**

The private Members will mobilise additional private funding for the implementation of those R&I output into market products or solutions where there is a clear business case without rail actors' coordination. Although a particular issue in rail is addressing the challenges of introducing innovation in a network industry which is fragmented structurally between infrastructure providers (IMs) and rail service operators (RUs) and also geographically (each Member State has a different IM). Much innovation is only viable if it is widely deployed across the European network, but the economic interests of IMs and RUs are often not aligned – in general the trend is to replace trackside assets by more intelligence (and thus equipment) on trains. IMs will realise large cost savings, but there is no direct benefit for RUs in spite of the additional costs they incur. Historically, for strategic reasons, each European railway developed standards and technologies independently of its neighbours – building trust and developing cooperation between them is challenging. The JU provides a vital and unique structure in which all these issues can be addressed cooperatively by the EU rail sector and its suppliers working together in a coordinated manner.

Additionally, the JU has already been designed from its inception with a reduced funding rate for its Flagship Projects, therefore increasing the level of private funding. The long-term engagement is also assured by the agreement of the rail sector in the EU-Rail System Pillar activities on the harmonised application of future regulations and standards, and by the actual implementation strategies developed within the EU-Rail Deployment Group. This latter if not closely followed-up and part of an EU implementing strategy risk although to diverge from the SERA objectives.

4.4. **Surplus assets following procedure for winding-up:**

In accordance with the accounting construction mechanism, a Joint Undertaking is created similarly as a Joint Venture, but without real capital assets or investments transferred to the JU net assets. The

in-kind contribution validated and transferred to the net assets does corresponds to real financial investments from the JU Members, but reported as such, and not brought to the JU. It is presented financially in this way in order to establish factually the leverage effect, expected as per the Council regulation. Consequently, no surplus of assets is expected to be made available from the JU in the context of the phase out. However, the investments of each of the members other than the Union, that have been reported as in-kind contribution by the end of the programming period may be considered, in agreement with each private members, and depending on their possible mobilised resources post 2031, in the context of possible activities associated after the phasing-out plan. This should be established from 2028.

5. ADMINISTRATIVE AND OPERATIONAL ADAPTATIONS

Given the long-term timeline of the phasing-out plan, it might not be possible at the earlier stage of its development to describe in detail all the necessary administrative and operational adaptations. However, to the extent possible, please describe the changes you foresee to become necessary to concretely move towards the short and long-term targets. This should also include an **indicative timetable**.

5.1. **Legal status [legal form, private entity, public/private association…]**

The main drivers for any future outcome are the priorities set for the next MFF, and the allocation in the next MFF by the EU of resources to implement the Single European Rail Area and the role of rail in the Single Market providing social benefit and competitiveness. Such a decision can be expected in 2027 after an agreement on the next MFF.

The following options have been identified:

a) The extension of the EU-Rail JU (or the creation of a similar structure for rail research) under the next MFF with Union financial contribution from the 10th Framework Programme for Research and Innovation.

   a. It can be constructed as a public-private institutionalized partnership similar to the current EU-Rail structure.

   b. Or it can also include national (Member States) contribution for R&I activities, i.e. a public-public-private institutionalized partnership.

   These options allow for continuation of the public-private partnership (in the form of a Joint Undertaking, art. 187 TFEU) and ensures highest continuity in addressing specific EU-wide targets with R&I.

b) Extending the scope of option (a) through entrusting EU-Rail or a new JU for R&I with the facilitation of pre-deployment of network solutions, and coordination of EU deployment under the next MFF. Such option would imply Union financial contribution from the 10th Framework Programme for research and also Innovation and other EU instruments.

   a. It can be constructed as a public-private institutionalized partnership similar to the current EU-Rail structure.

   b. Or it could include on national (Member States) contribution in particular for the pre-deployment part, not excluding the contribution for R&I activities, i.e. a public-public-private institutionalized partnership, or also with the complementary use of Important Projects of Common European Interest with a possible future European competitiveness fund or alike.

   These options ensure also continuity of R&I but also further increase impact and foster competitiveness, requiring a higher level of commitment and resources from the public and

private members of the partnership. It addresses specific EU-wide targets with implementation at regional and national level.

c) Bringing EU rail research to an Executive Agency of the European Commission. Another option is to making EU-Rail JU into a research and deployment agency. These options mean the end of a public-private partnership, while it ensures a certain degree of continuity, although the legal and institutional consequences of such an approach needs to be further studied. Potentially for example the Work Programmes would be subject to comitology.

d) Transforming EU rail research to a partnership under Article 185 of the TFEU. Article 185 initiatives are long term public-public partnerships established on a voluntary basis by EU Member States that are also eligible for a substantial financial contribution from the EU Research Framework Programme. They are established through the EU ordinary legislative procedure and require a Dedicated Implementation Structure. Such option presumably primarily focuses on aligning and integrating national research programmes, hence the impact at EU level might be less strong than in the case of a partnership based on Art. 187 TFEU.

e) No future institutionalised partnership:

- Rail research and innovation supported by the EU though the thematic work programmes in FP10.
- Rail research and innovation implemented by the sector without EU coordination nor funding.
- Different type of partnership set up under FP10. This will depend on the outcome of the reflection on the partnerships as instrument under FP10.

5.2. **Staffing**

In line with the Legal and Financial Statement annexed to the proposal for the SBA, the following **estimate of the staff needs** in the transition phase or phasing out from Programme funding has been established by the EC services and will be complied by the EU-Rail:

Function group and grade	Year 2029	Year 2030	Year 2031	Post 2031
AD16				
AD15				
AD14	1	1	1	0
AD13				
AD12	2	2	2	0
AD11	1	1		
AD10				0
AD9				
AD8	3	2	2	0
AD7				0
AD6				0
AD5				
AD Total	7	6	5	0

Contract agents	Year 2029	Year 2030	Year 2031	Post 2031
Function group IV	10	8	6	
Function group III				
Function group II	1	1	1	
Function group I				
Total	11	9	7	0

Total staff	Year 2029	Year 2030	Year 2031	Post 2031
Total	18	15	12	0

In case of phasing out of the current JU without a renewal of a new Programme building up on its achievements and further innovating with new Policy objectives, despite the availability of positions in EU-Rail, the likelihood of an early departure of staff is considered high. This scenario will impact the closure of the programme, with the difficult challenge to recruit qualified staff to support the phase out of the programme. Should that be confirmed, an annual assessment of available human resources is needed from 2026 onwards to estimate the needs and possibly adjust the current estimation and phasing-out plan activities.

5.3. **Accounting and Cashflow**

In accordance with the Legal and Financial Statement annexed to the proposal for the SBA, the estimated impact on expenditure for the years 2028-2031 is expected as following:

Europe's Rail Joint Undertaking			***Post 2027*** ***EUR million (to three decimal places)***
Title 1	Commitments	(1)	
	Payments	(2)	5.414
Title 2	Commitments	(1a)	
	Payments	(2a)	2.355
Title 3	Commitments	(3a)	
	Payments	(3b)	77.231
TOTAL appropriations for Joint Undertaking	Commitments	=1+ 1a +3a	
	Payments	=2+ 2a+ 3b	85.000

The accounting and budget management would be done by the EU-Rail Programme Office with the available staff in accordance with the previous section.

These years are planned to be executed with (EU budget) payment appropriations from the implementation and closure of existing administrative and operational expenditures of procurement contracts and grant agreements. Those latter are described in the following section 5.5.

However, some new administrative commitments and contracts between 2028 and 2031 will be necessary for the functioning of the JU. The EU-Rail Programme Office will be in position to conclude such commitments by making use of the JU unused commitment appropriations, and the private Members contributions to the JU's administrative expenditure. These commitments include the staff expenditure (salary, mission, and others), as well as the JU running costs (renting contract, audits, etc.).

EU-Rail will keep its financial and reporting obligation, in accordance with the JU's Financial Rules. The Programme Office will therefore continue to prepare the JU's annual accounts, monitoring the financial contributions from partners and the assets of the organisation until 31/12/2031. The final accounts of EU-Rail – due by June 2032 together with the 2031 Annual Activity Report will have to be prepared in the context of the legacy management.

Post 2031, in case of phasing-out of the current JU without a renewal of a new Programme building up on its achievements and further innovating with new Policy objectives, all the remaining obligations will be transferred to the relevant EC Services.

5.4. **Procurement, Logistics and IT**

In a phasing-out situation, the last procurements, logistic and IT purchase, including assets, would be done between 2028 and 2031.

The administrative phase-out of any commitment and associated contractual obligation, as well as fixed assets or physical items will be withdrawn from inventory by 2031.

On the side of Logistics, and during the period 2028-2031, the most important aspects are related to the management of the building where the JU is located, the office furniture and consumable, the IT infrastructure and material. The JUs, located in the White Atrium building, have a rental contract until 31/12/2031. By that date a move will have to be budgeted and organised in order to vacate the premises. For what concerns the IT infrastructure, the framework contract with the IT service providers will be maintained until that date.

5.5. **Follow up of grant agreement obligations after the end of projects.**

Regarding the JU's legal obligations, the Programme Office will monitor from 2027 onwards the duration of contracts, framework contracts and SLAs taking into account the date of the winding up of the JUs. Progressively over the years, the JU should conclude a lower number of contract and none of them shall go beyond the 31/12/2031. A strong effort will be done in 2030 to ensure the respect of the deadline, with the object to prevent any payments to be concluded beyond.

An inventory of legal commitments in the form of procurement contracts and grant agreement will be established between 2028 until 2031, establishing the list of obligations such as record keeping, archiving, result delivery, data protection elements and document management retention period that are expected for each legal commitment. Thus allowing the new legal structure to monitor any legal requirements, in particular relevant in case of audits.

The list of obligations will be established, in greater details, considering the following elements:

- For grant beneficiaries:

RECORD-KEEPING in accordance with the Lump Sum Model Grant Agreement ARTICLE 20

"The beneficiaries must keep appropriate and sufficient evidence to prove the eligibility of all the costs declared, proper implementation of the action and compliance with all the other obligations under the Grant Agreement. If costs are not supported by appropriate and sufficient evidence, they will be rejected. 'Sufficiency' relates to the quantity of evidence; 'appropriateness' relates to its quality. Evidence is considered sufficient and appropriate if it is persuasive enough for the auditors, who assess it according to generally accepted audit standards. The evidence must be verifiable, auditable and available. It must be correctly archived for the duration indicated in the Grant Agreement.

In general, ***for at least 5 years after the balance is paid*** *(3 years for low value grants up to EUR 60 000) or longer if there are ongoing procedures (audits, investigations, litigation, etc). In this case, the evidence must be kept until ongoing procedures end.*

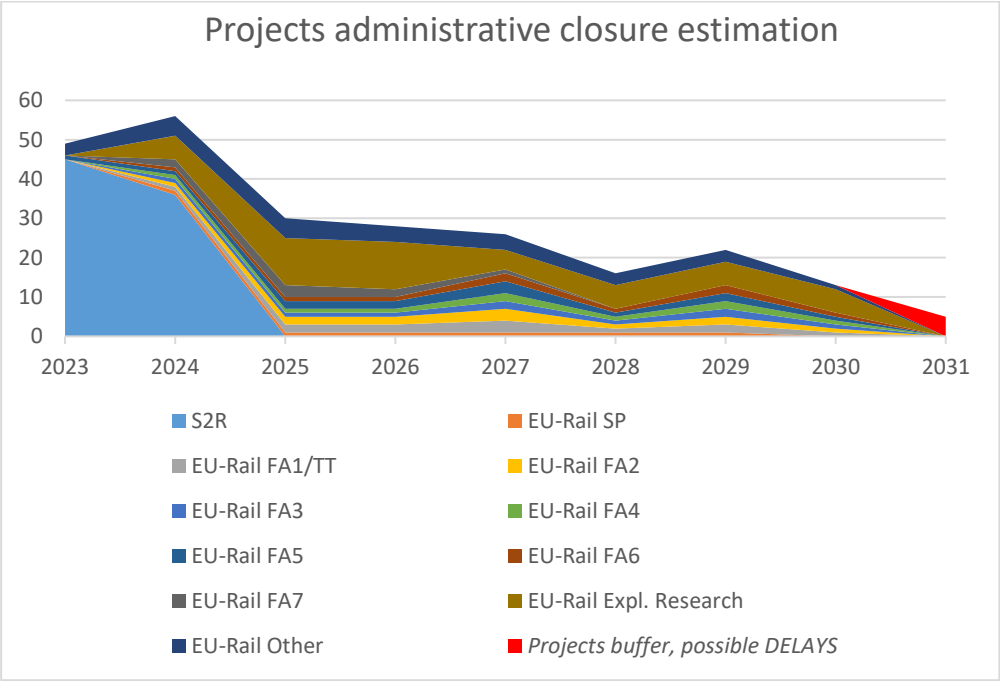
- For contractors:

For contractors: CHECKS AND AUDITS (Article II.24.General conditions): The contractor must *keep all original documents stored on any appropriate medium, including digitised originals if authorised under national law,* ***for a period of five years starting from the payment of the balance***

- For EU-Rail:

For EU-Rail (as contracting and granting authority), the JU should apply the rules on retention as per its Document Management Policy https://rail-research.europa.eu/wp-content/uploads/2022/12/EU-Rail_DMP_20221206_final_clean.pdf

The ability of the EU-Rail Programme Office to perform its grant agreement monitoring and closure tasks is embedded with the R&I Programme design of its implementation through grants and tenders. The following table present the evolution of the expected projects per year, during and after the phase-out transition.



It is to be noted, that the number of projects do not represent the sole element to consider for the estimated workload for the Programme Office, as the EU-Programme has been purposefully designed with large Flagship Projects that would be capable to achieve an Impact at system level (not sub-components) by reducing the number of projects and increasing their respective size, values and also complexity. Administratively those projects have an increased the number of tasks, deliverables, results, KPIs and dissemination activities to be monitored, supervised and assessed by the JU.

The following table presents the average magnitude of projects distribution in million EUR, during and after the phase-out transition.

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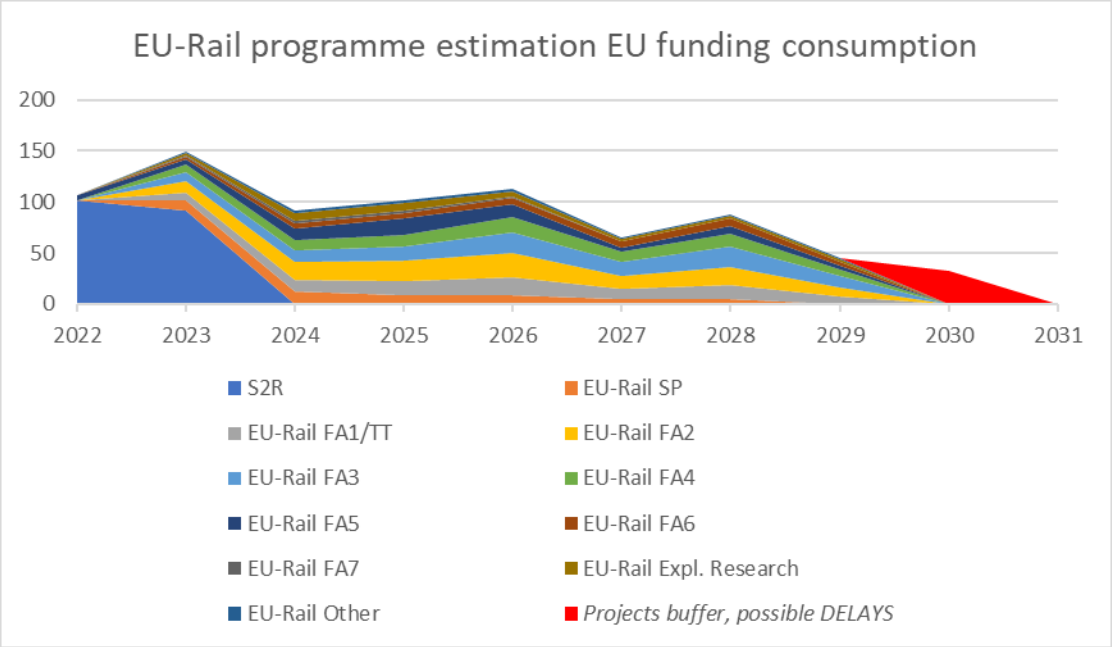
EU-Rail programme estimation EU funding consumption
200
150
100
50
0
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
S2R
EU-Rail SP
EU-Rail FA1/TT
EU-Rail FA2
EU-Rail FA3
EU-Rail FA4
EU-Rail FA5
EU-Rail FA6
EU-Rail FA7
EU-Rail Expl. Research
EU-Rail Other
Projects buffer, possible DELAYS

6. CONCLUSIONS

EU-Rail and S2R have and still are fundamentally changing the landscape of European rail research and innovation, achieving a coordinated partnership of the industry with the Union delivering European solutions that is transforming the European rail system, benefiting passengers and freight customers in Europe and strengthening European industry competitiveness.

The JU provides a vital and unique structure in which all these issues can be addressed cooperatively by the EU rail stakeholders working together in a coordinated manner. This enables European approaches to be found enabling the power of the European internal single market versus bespoke national solutions. The R&I output of the JU proved to be instrumental in the capacity of delivering the Single European Area, creating synergies with other sectors and in full cooperation with the bodies of the European Union and its Institutions.

EU-Rail will continue to carry out this role during the full course of its mandate.

The considerations during the latter period of the mandate will be heavily influenced by the considerations and choices for any continuation of activities under the next MFF period.

There are a number of options under consideration as highlighted in section 5.1. above ranging from a renewed and extended mandate under the JU structure to a cessation of activities at European level. These options come with associated impacts and trade-offs.

Whilst it is the view of the EU-RAIL Governing Board that an extension of activities is important, even essential, for the continued success of rail innovation within Europe to the benefit of its citizens and businesses, the planning for all activities in terms of operational and administrative steps has been considered and is summarized below:

Task	**Lead**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**Beyond 2031**
EC proposal for a new Framework Programme for Research and Innovation	EC	X						
Decision on EU-RAIL phasing-out	EC		X					
Legacy decision	EC		X					
Human Resources planning/adjustment	EU-RAIL	X	X	X	X			
Budget planning/adjustment	EU-RAIL	X	X	X	X	X	X	
Annual accounts	EU-RAIL	X	X	X	X	X	X	

Logistics and IT	EU-RAIL	X	X	X	X	X	X	
Monitoring of contractual obligations, incl. project closure and follow-up	EU-RAIL	X	X	X	X	X	X	
Monitoring of financial contributions	EU-RAIL	X	X	X	X	X	X	
KPIs monitoring	EU-RAIL	X	X	X	X	X	X	
Transfer to legacy management entity							X	X

All tasks indicated above will be detailed in the related EU-Rail Annual work plans.

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