

**Position Paper for Enhanced Participation of Universities, Rail Research Centers and SMEs in FP10 Rail Research**

## Executive Summary

The upcoming Framework Program 10 (FP10) offers a pivotal opportunity to urgently recalibrate and enhance the **participation of universities, rail research centers and SMEs in rail research and innovation projects.**

Currently, researchers represent a mere 13% (university 5%, research centers 8%) of the stakeholders involved in stark contrast to their 26-45% participation rate in other transport modes and, more discretely, in the previous Shift2Rail (ca. 20%). When it comes to SMEs participation only 2% of the budget is dedicated to this important category of company (Fig.1, 2, and 3).

This disparity undermines the scientific production in form of open access and indexed publications, potential for innovation, interdisciplinary collaboration, and the overall advancement of rail transport technologies. Increasing their involvement will yield substantial benefits, including the acceleration of cutting-edge research, the integration of academic expertise with industry practices, and the cultivation of a skilled workforce prepared to tackle future challenges in the rail sector.

Additionally, addressing the current industry-dominated and national-clustered structure of the Rail Joint Undertaking (JU) is crucial for fostering a more inclusive and cooperative European rail research environment.

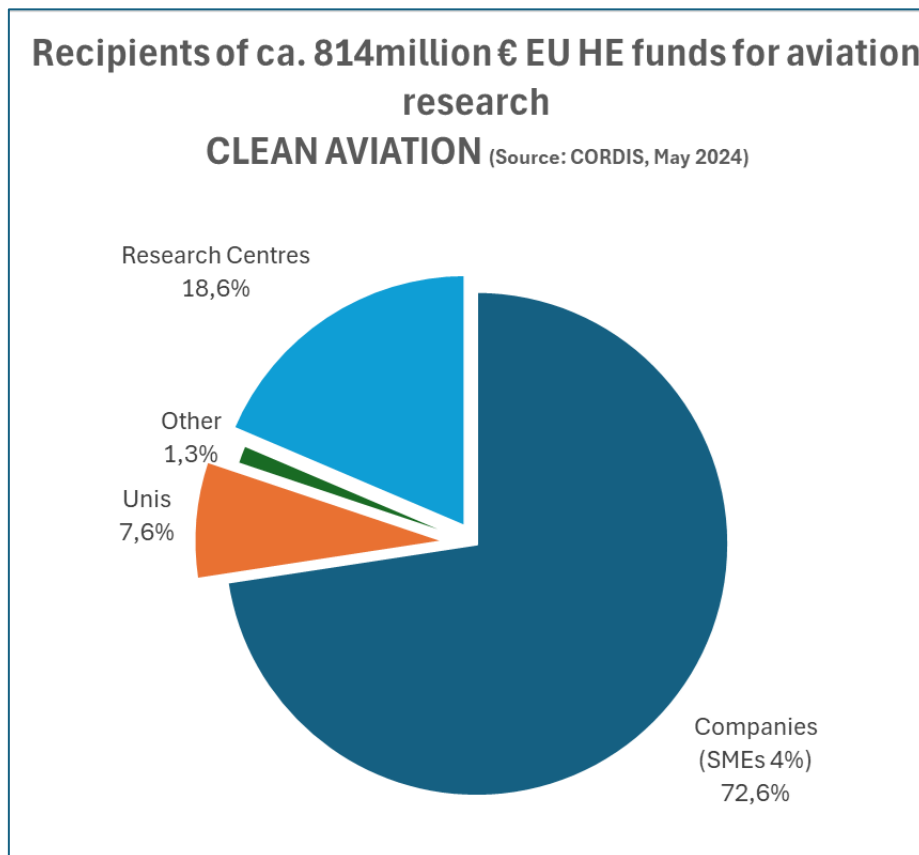


Fig 1. Recipients of EU funds in clean aviation

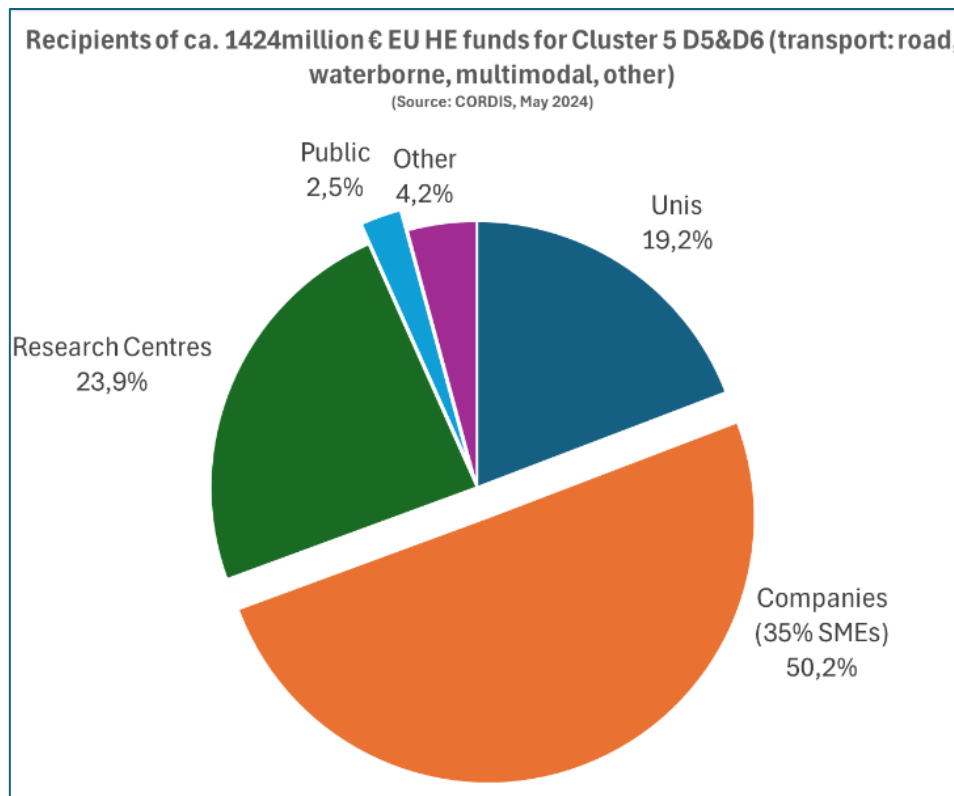


Fig 2. Recipients of EU funds in CL5 transport (road, maritime, logistics)

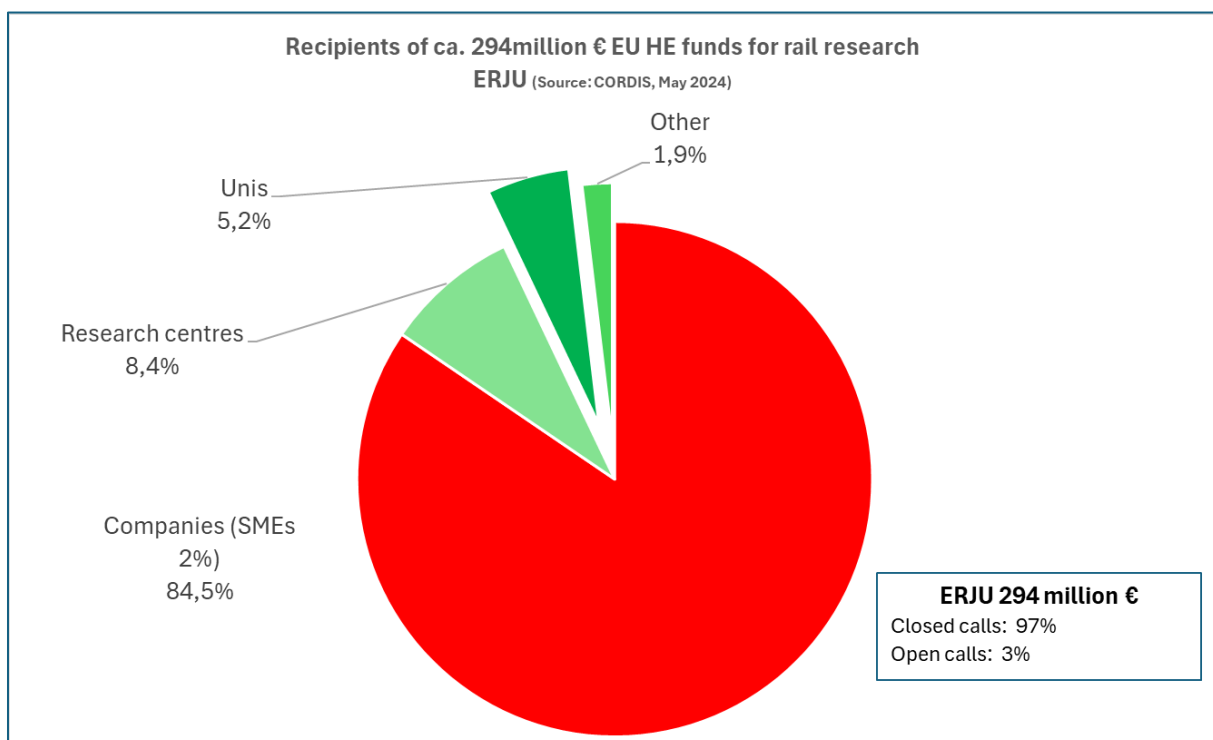


Fig 3. Recipients of EU funds in Europe's' Rail Joint Undertaking

## Introduction

The European rail sector is at a crossroads, facing significant challenges that demand innovative solutions. To remain competitive, sustainable and to attract demand, it is crucial to harness the full potential of academic and research institutions. Despite their proven track record in other transport modes, universities and rail research centers are underrepresented in rail research under the current FP9 framework. FP10 must address this imbalance by creating mechanisms that encourage and facilitate their greater involvement. Moreover, it is essential to re-evaluate the structure of the existing JU, which is predominantly industry-driven, to better accommodate and benefit academic institutions.

## Current Participation Disparity and Structural Issues

Data (CORDIS) indicates that universities and rail research centers are receiving only 13% of rail research budget in FP9, compared to a robust 24 to 45% share in other transport modes and in the previous program Shift2Rail (ca. 20%). This discrepancy highlights an untapped reservoir of knowledge and expertise that could significantly benefit the rail sector.

The current JU, while well-intentioned, is structured in a way that inherently favors large industry and company (members) participation ignoring SMEs participation (only 2%), often leading to national clustering and limiting the scientific production in the form of indexed high-quality publications.

To address low academic participation, universities and research centers have been engaged as affiliates of large companies. However, this approach has not significantly improved participation and remained ineffective. Universities and research centers should avoid such affiliations, as they can compromise academic integrity. Companies' focus on immediate results may limit the depth and breadth of research, which should strive for comprehensive and long-term exploration in both basic and applied sciences. **Independent university research is crucial for European competitiveness, driving innovation and maintaining a leading edge in the global market.**

## Scientific Publications

Regarding publications, the primary output of research activities, the previous Shift2Rail program demonstrated that open calls—typically involving academia—outperformed member calls in both quantity and quality, even with 1/3 of the budget.

Furthermore, most of CFM's publications were produced by academic institutions participating as linked third parties in these projects.

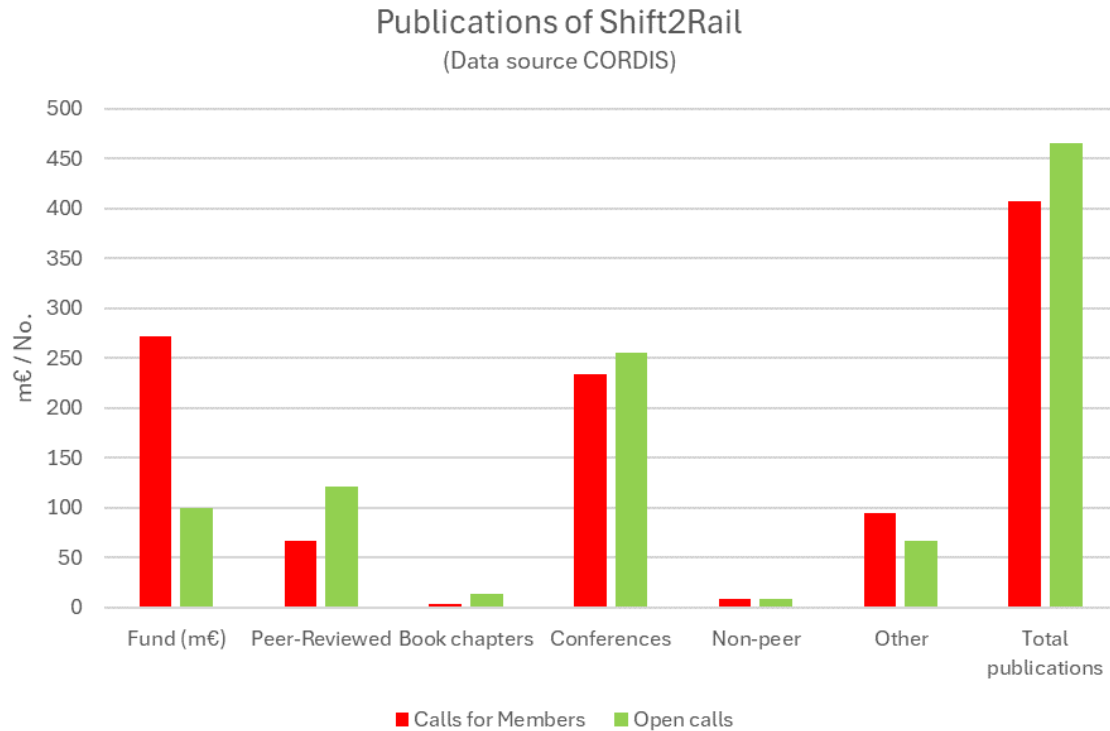


Fig 4. Fund allocation and publications of Shift2Rail

We fear that the current design of ERJU will result in fewer publications due to even lower academic participation.

### Other results, innovation

The European Rail Joint Undertaking (ERJU) aims to revolutionize the railway sector by driving innovation, improving competitiveness, and achieving significant advancements in technology and operations. ERJU's objectives include enhancing the efficiency, reliability, and sustainability of rail transport, while fostering the integration of new digital and green technologies. The program seeks to deliver tangible results, such as cutting-edge demonstrators, prototypes, and industrial applications that can be swiftly implemented across the European railway network.

Given the industrial nature of the railway sector, it is reasonable to anticipate that investments in close-to-market research would quickly result in demonstrators, prototypes, and the eventual industrialization of research outcomes. However, according to Shift2Rail's catalogue of solutions (<https://rail-research.europa.eu/publications/catalogue-of-solutions/>), their integration into the European market remains challenging, and the modal split continues to present difficulties. While market expectations have not yet been fully met, there is significant opportunity to enhance the value derived from research investments.

For large companies looking to innovate while being cautious about publishing research results, Horizon Europe, may not be the ideal funding mechanism. This pillar focuses on early-stage research and emphasizes open science, which may not align with the strategic interests of companies aiming to protect their intellectual property.

Instead, other EU funding mechanisms and/or a smart combination thereof are better suited for supporting higher Technology Readiness Levels (TRLs) and commercialization activities providing significant funding and resources for later-stage development, including prototyping, testing, and market deployment. By using combined vertical and transversal EU funding sources, companies can more efficiently advance their innovations while maintaining control over research dissemination.

## Advantages of Increased Academic Participation

### Enhanced Innovation and Research Quality

Universities are hubs of innovation, continuously pushing the boundaries of technology through basic and applied research. Their participation can lead to breakthroughs in rail technology, safety, and efficiency.

Academic institutions often foster interdisciplinary research, integrating insights from engineering, environmental science, economics, and social sciences, leading to more holistic and sustainable solutions.

### Bridging the Gap between Academia and Industry

Universities and research centers serve as conduits for transferring emerging technologies and methodologies to the rail industry, ensuring that the latest scientific advancements are rapidly adopted and implemented. Researchers generally have more permanent positions than engineers in industry, which can help avoid duplication of research and capitalize on knowledge more effectively.

Increased participation will foster robust collaboration networks, bridging the gap between theoretical research and practical applications, and enhancing the overall innovation ecosystem.

### Workforce Development and Training

Universities play a critical role in training the next generation of engineers, researchers, and industry leaders. Their involvement in FP10 projects will ensure that students gain practical experience and are well-prepared to meet the industry's future needs.

Academic institutions can also contribute to continuous professional development programs, ensuring that the existing workforce remains abreast of the latest advancements and best practices.

### Economic and Societal Impact

University-led projects often stimulate regional economic growth, creating jobs and fostering local innovation clusters around rail research hubs.

Academic research often addresses broader societal challenges, such as environmental sustainability and public health, aligning rail research with public policy goals and societal needs.

EU-funded research makes also possible to keep alive rail research competences and activities in countries where the national-funded research in the sector is absent or negligible.

## Promoting European Cooperative Spirit

A more inclusive framework that integrates universities and research centers can mitigate the tendency towards national clustering, fostering a more genuinely European collaborative approach.

By involving a diverse range of stakeholders from across Europe, FP10 can enhance the cohesion and effectiveness of rail research efforts, promoting a unified European research community.

## Advantages of Increased SMEs Participation

### Importance of SMEs and innovation in the EU economy

According to the European Commission's Annual Report on SMEs 2017/2018, SMEs account for 99% of the companies operating in the EU non-financial business sector, 66% of total employment, and 57% of value-added in the EU's non-financial business sector. Both the European Parliament and the Council have stressed the importance of supporting innovation, particularly breakthrough innovation, and the growth of start-ups and SMEs. They have noted that support for innovative SMEs and start-ups is essential to maximizing Europe's potential for growth and socio-economic transformation. Academic studies have demonstrated the relationship between entrepreneurship, SME activity, economic growth, and job creation.

The Europe 2020 Strategy emphasizes the importance of innovation in boosting growth and employment in the EU. "Innovation Union" is one of the Strategy's seven flagship initiatives, aiming "to create an innovation-friendly environment that makes it easier for great ideas to be turned into products and services that will bring economic growth and jobs."

By leveraging the strengths of academia and SMEs, research efforts can achieve greater diversity, foster innovative breakthroughs, and contribute more significantly to Europe's economic growth and socio-economic transformation.

## Underinvestment in Railway Research

Despite the European Commission's stated commitment to reducing greenhouse gas emissions and promoting sustainable transport, the allocation of funds for railway research remains disproportionately low compared to investments in other modes of transport (Fig.1, 2, 3). This funding imbalance seems incongruent with the Commission's Green Deal objectives, which emphasize the necessity of cutting carbon emissions and transitioning to greener transport solutions. Railways, with their lower energy consumption and reduced emissions, align perfectly with these goals, yet the budget allocations do not reflect this strategic priority. It is imperative that the EC aligns its funding with its policies to achieve the ambitious climate targets set for 2030 and beyond.

## Recommendations for FP10

To enhance the participation of universities, rail research centers and SMEs in FP10 and address the structural issues of the current JU, the following measures should be implemented:

- Increase the budget for railway and innovation research: Ensure balanced EC investments across all transport modes to prevent railways from being underfunded compared to other transport sectors/modes.
- Dedicated funding streams: Allocate specific funding within FP10 dedicated to projects led by or involving universities and research centers of at least 30% of the total fund for rail research.
- Revised JU Structure: Reassess and redesign the JU to ensure it is by design more inclusive of academic and research institutions and SMEs, promoting a more balanced participation.
- Increase STEM and social sciences areas funding for railway: Promote areas such as technology, economics, history, social sciences, and humanities. This ensures comprehensive research support and highlights the cost-effectiveness of social science research, where academics already excel compared to industry and non-academic researchers.

Signed by:

**EURNEX: European Rail Research Network of Excellence**

Dr.-Ing. Armando Carrillo Zanuy, Secretary General EURNEX

On behalf of:

- KTH Royal Institute of Technology, Railway Group, Stockholm, Sweden
- Politecnico di Milano, Dipartimento di Meccanica, Italy
- École des Ponts ParisTech, France
- University of Porto-Faculty of Engineering., Porto, Portugal
- On Track Lab, Ghent, Belgium
- Austrian Institute of Technologie (AIT), Vienna – Austria
- University of Zagreb, Faculty of Transport and Traffic Sciences Department of Railway Transport, Zagreb, Croatia
- Universidad Politécnica de Madrid, Madrid, Spain
- University of Applied Sciences Upper Austria -Research group Rail Automation and Traffic Telematics, Wels, Austria
- University of Belgrade – Faculty of Traffic and Transport Engineering, Belgrad, Serbia
- University of Zilina, Faculty of Management Science and Informatics, Zilina, Slovakia
- SAPIENZA University of Rome, DICEA Department of Civil, Building and Environmental Engineering, Italy
- Riga Technical University, Riga, Latvia
- TTK University of Applied Sciences (Faculty of Transport) Tallin, Estonia
- Université Gustave Eiffel, France
- University of Leeds, Institute for Transport Studies, Leeds, UK
- Université Polytechnique Hauts-de-France (UPHF)
- Berlin Partner für Wirtschaft und Technologie GmbH, Berlin, Germany
- Brno University of Technology, Brno, Czech Republic
- Czech Technical University in Prague, Faculty of Transportation Sciences, Czech Republic
- Centre for Research and Technology Hellas/ Hellenic Institute of Transport, Thessaloniki, Greece
- Universidad del País Vasco – Escuela T.S. Ingeniería, Bilbao, Spain
- Technische Universität Berlin, FG Schienenfahrzeuge, Berlin, Germany
- Technische Universität Berlin, FG Bahnbetrieb und Infrastruktur, Berlin, Germany
- Instytut Kolejnictwa, Warsaw, Poland
- Jan Perner Transport Faculty, University of Pardubice, Czech Republic
- Kaunas University of Technology, Kaunas, Lithuania
- Lulea University of Technology, Luleå, Sweden
- Politechnika Śląska (Silesian University of Technology), Poland
- Slovenian National Building and Civil Engineering Institute, Slovenia
- Vilnius Gediminas Technical University, Vilnius, Lithuania
- VUZ – Railway Research Institute, Czech Republic
- RWTH, Aachen University, Rheinisch Westfälische Hochschule Aachen, Germany
- SUPSI – University of Applied Sciences and Arts of Southern Switzerland
- (Corresponding member) Beijing Jiaotong University, Beijing, China

**ERICI: European Railway Clusters Initiative**

Veronica Elena Bocci, Vice-President

On behalf of:

- DITECFER (IT)
- Rail.S (DE)
- Logistics in Wallonia (BE)
- I- Move by Railgrup (ES)
- MAFEX (ES)
- i-Trans (FR)
- CNA (DE)
- Cluster Transport, Mobility and Logistics Berlin-Brandenburg (DE)
- Rail Forum (UK)
- Scottish Rail Cluster (UK)
- BRIC (UK)
- PFP (PT)
- RCSEE (Serbia, Montenegro, Croatia, Slovenia, Bosnia and Herzegovina, North Macedonia)
- Southern Railway Cluster (PO)
- ARUS (TR)
- Eskişehir Chamber of Industry (TR)
- Järnvägsklustret (SE)
- ACStyria Mobilitätscluster (AT)