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Connecting European railways

Reorienting the Connecting Europe Facility programme to support swifter network integration

T&E

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Executive summary

The European Commission is considering whether to maintain the Connecting Europe Facility (CEF) in the next budget. As the only dedicated financial instrument for cross-border connections, **extending its use is vital to achieving real interconnectivity of rail throughout Europe**. However, accomplishing this will only be possible through a serious overhaul of its funding priorities.

A third of CEF Transport funds goes to only seven projects

The majority of CEF Transport funds were directed to rail flagship megaprojects between 2021 - 2023



Source: CINEA • CEF Transport 2021-2023



Of the €15.5 billion dedicated to rail between 2021 and 2023, nearly half went to just seven megaprojects. Yet smaller-scale projects focused on key upgrades are essential to meeting the infrastructure quality targets set for the Trans-European Transport Network (TEN-T). Among these upgrades, electrification received the largest share of funding—accounting for 20% of all CEF transport rail funds—followed by line speed improvements at 18%.

However, these necessary upgrades have failed to secure funding levels comparable to megaprojects, even as Member States continue to fall behind on their objectives. For example, only €0.7 billion has been allocated to the deployment of the EU's standardised signalling system (ERTMS), while full

implementation could cost tens of billions. ERTMS funding increased significantly in the 2024 call, a positive development that puts it on a hopeful path. But it is still trailing behind other essential upgrades, as it received only close to a third of the funds directed to rail electrification. ERTMS will require a stronger push to gain the momentum it needs.

Large megaprojects like the Eurotunnel and the Øresund Fixed Link have revolutionised cross-border travel. Their full potential, however, remains untapped, with additional capacity available to increase rail services through them. The EU should therefore continue to invest in transformative projects, but not at the expense of the **broader upgrades needed to achieve interoperability throughout the entire corridors**.

A future CEF 3 should have a reduced emphasis on flagship megaprojects in order to free up capacity to fund a much larger number of projects, resulting in an acceleration of TEN-T implementation. A 25% increase in the CEF's budget for rail could nearly double the funds available for the broader upgrades needed to deliver the TEN-T. By committing or frontloading fewer funds at the start, the programme would allow for better resource allocation and more flexibility to respond to strategic needs throughout the budget period.

1. Introduction

Breaking down the barriers in European railway between countries is one of the EU's aspirations. To achieve this, considerable funding will be needed to upgrade signalling, electrification and gauges to a harmonised European standard. Missing links will also need to be built in order to unlock effective cross-border connections. The Trans-European Transport Network (TEN-T) lays out the planning and obligations to accomplish this and since 2014 the [Connecting Europe Facility](#) (CEF) has provided funding to help member states comply with this framework. But Europe has advanced very slowly with the integration of its railway networks.

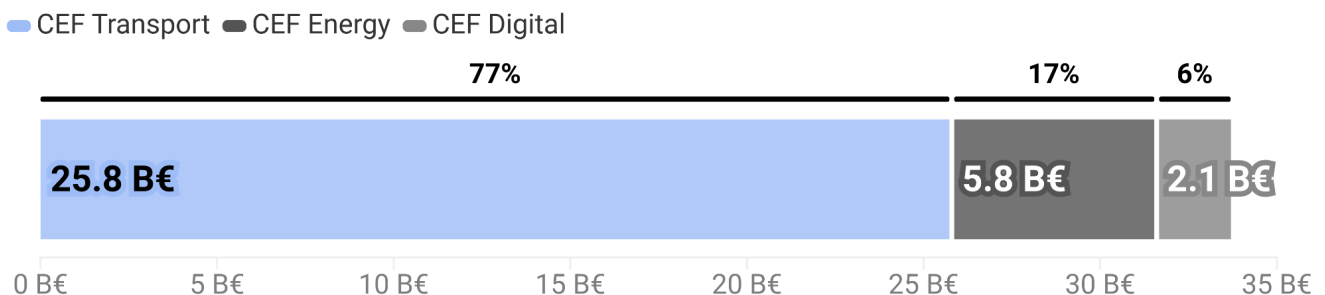
1.1 The Connecting Europe Facility

The CEF was created in 2014 to provide a dedicated funding mechanism for the infrastructure needed to realise the Trans-European Networks (TEN). In 2021 the instrument was continued as part of the present EU long-term budget period by the name of CEF 2, ending in 2027. The CEF is managed by the Climate, Infrastructure and Environment Executive Agency ([CINEA](#)).

It is divided into three sections:

- **CEF Transport:** Supports projects in the Trans-European Transport Network concerning the construction of new links or the upgrade of existing connections along these corridors.
- **CEF Energy:** Aims to scale up cross-border energy infrastructure across Europe through the Trans-European Networks for Energy, as well as reinforce the existing links.
- **CEF Digital:** Promotes investment in key European digital connectivity infrastructure.

CEF Transport is the biggest share of CEF funds



Source: CINEA • Connecting Europe Facility 2021-2027 adopted



1.2 The evolution of the CEF

The instrument is consistently oversubscribed, up to [three times](#) over the total budget available in one of its latest calls. However, the slow advancement in the implementation of the TEN-T

after two iterations of the CEF underlines that without significant changes the program will fail to deliver its milestones in time.

The European Commission will release its proposal for the next Multiannual Financial Framework (MFF) in July 2025 and it is uncertain in which shape or form the CEF will be continued beyond 2027. According to the [initial communication](#), more EU funding would be distributed via “national and regional investment plans” which could lead to a ‘nationalisation of the EU budget’. In this context, a continuation of the CEF will be ever more important to secure funding for cross-border network connections.

Consistently with the ambition to make the EU budget simpler, more focused and more impactful, our report analyses the rail expenditure in the current CEF 2 to understand if the spending is sufficiently prioritising key infrastructure upgrades that can achieve widespread interoperability in the short and medium term. To do so we analyse how much money flagship megaprojects absorb from the EU budget and whether they are ultimately slowing down the modernisation of the network.

2. Methodology

2.1 What are rail ‘flagship megaprojects’ and what are ‘key upgrades’?

In their [2020 report](#), the European Court of Auditors refers to megaprojects as “*Transport Flagship Infrastructures*”. They define such projects as EU co-funded large projects with a cross-border dimension, relevant for the completion of the TEN-T network and with an overall cost superior to €1 billion.

For this study, we focus specifically on megaprojects that are particularly capital-intensive and can take decades to be completed. As a consequence, our analysis targets seven of the largest ongoing infrastructure megaprojects. Throughout this report, we refer to such megaprojects as “**Rail flagship megaprojects**”. We purposely excluded smaller megaprojects, those that do not absorb a significant share of EU funding and those focused on the upgrade and modernisation of existing railway lines.

Europe’s railway infrastructure needs to rise up and play a significant role in transport decarbonisation to face the climate crisis. Nowadays European trains have to overcome different signalling systems, track gauges and electrification systems when attempting to cross borders. This severely limits their ability to provide strong and reliable international connections.

[In a previous report](#), T&E identified 6 key indicators that need to be undertaken to efficiently upgrade the European rail network:

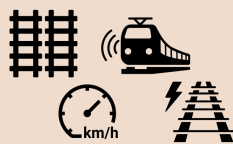
- Accelerate European Rail Traffic Management System (ERTMS) deployment for high quality, efficient infrastructure
- Increase maximum speeds to 160 km/h for conventional lines
- Increase capacity through additional tracks where needed

- Boost rail electrification
- Advance in the standardisation of track gauges in a phased manner
- Develop key missing high-speed links (HSL)

It is important to note that the 160 km/h speed threshold is based on the TEN-T regulation, which mandates that every line included in the core and extended TEN-T need to allow a speed of 160 km/h. According to the minimum speed requirement of the TEN-T high-speed rail network, we used a threshold of 200 km/h to consider a project as high-speed rail.

In this report, we refer to projects aiming to develop at least one of these six key actions as “**Key upgrades**”.

Rail key upgrades



Projects needed to be undertaken to efficiently upgrade European rail network, especially:

- ERTMS deployment
- Upgrade line speeds (max 160km/h)
- Additional tracks
- Line electrification
- Track gauge standardization
- HSR missing links*

* Nb: Lines in the core and extended core networks that do not meet the criteria for flagship megaprojects

Flagship megaprojects



New infrastructure megaprojects in or in the process of starting construction that are particularly capital-intensive and prone to substantial delays:

- Rail Baltica
- Brenner base tunnel
- Lyon Turin tunnel
- Porto Lisbon HSL
- Fehmarnbelt tunnel
- Y Vasca
- Stuttgart 21

2.2 Project classification

Our analysis focused on CEF Transport funds, for the ongoing funding period (2021 - 2023, as at the time of the analysis projects funded under the 2024 call were not yet publicly available). The list of projects funded under CEF Transport between 2021 and 2023 was downloaded from the [CINEA project portfolio dashboard](#) (the cutoff date for data download was the 16th of May).

For this period, 630 proposals were supported by CEF Transport. Thanks to each title and description, we classified proposals based on the decision tree displayed below. To systematically pre-identify the categories of each proposal (non rail, rail, ERTMS deployment, track electrification...), we used OpenAI's GPT model API (gpt-4o-mini), applying a structured

prompt-based approach to ensure consistent classification. Each category was then manually cross checked to determine if a proposal was correctly categorised. It is important to note that a single proposal can belong to multiple categories, such as gauge standardisation and speed upgrade, or line electrification and additional tracks for instance.

Among the 630 proposals, 277 were identified as rail proposals. On these rail proposals, 27 were identified as being linked with one of the seven rail flagship megaprojects, and 120 were identified as being linked with at least one of the six key upgrades.

After proposal categorisation, we grouped together proposals belonging to the same infrastructure project (for instance, the Y Vasca project received CEF Transport funds thanks to two proposals, and Rail Baltica through 9 proposals).

2.3 Estimating the impact of a CEF Transport budget increase on rail key upgrade funding

Projects funded under the 2021, 2022, and 2023 calls amount to €21.1 billion, representing 82% of the €25.8 billion of CEF Transport budget available for 2021–2027. Between 2021–2023, €5.7 billion were allocated to rail key upgrades, which represent 27% of CEF Transport expenditures in that period. To estimate the overall envelope that could be allocated to key rail upgrades within the whole current financial framework, we applied the observed share of funding dedicated to such projects to the full CEF Transport envelope, which led to an estimated €7 billion. To support our policy recommendations, we then simulated the impact of a potential increase in the CEF Transport budget for CEF 3 on funding available for rail key upgrades. Results are displayed in section 4.1.

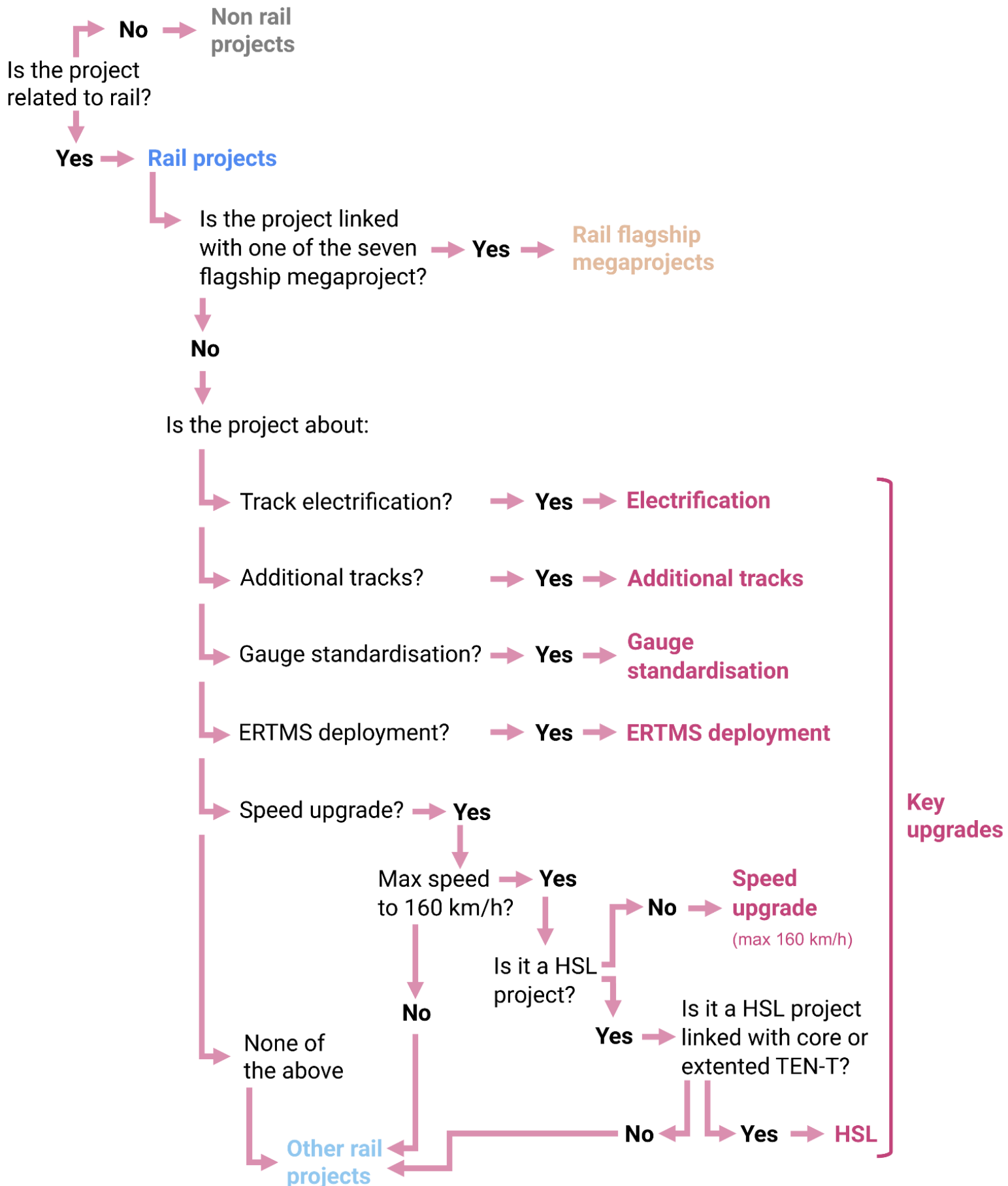
2.4 CEF Transport 2024

On the 3rd of July of 2025, CINEA announced that [94 projects were selected](#) for the CEF Transport 2024 call. These results are provisional, as the Commission still has to formally approve the selected projects, which should be done by October 2025. The [list of selected projects](#) contains a succinct description, as well as “*Recommended Fundings*”, as final agreements are still pending on the exact money allocated to each project.

Given the preliminary nature of this data, we chose to focus our main analysis on projects selected for the 2021 - 2023 calls. We are discussing the latest developments of the 2024 call in a separate infobox at the end of section 3.

CEF Transport projects categorisation

Decision tree for classification



3. Analysis

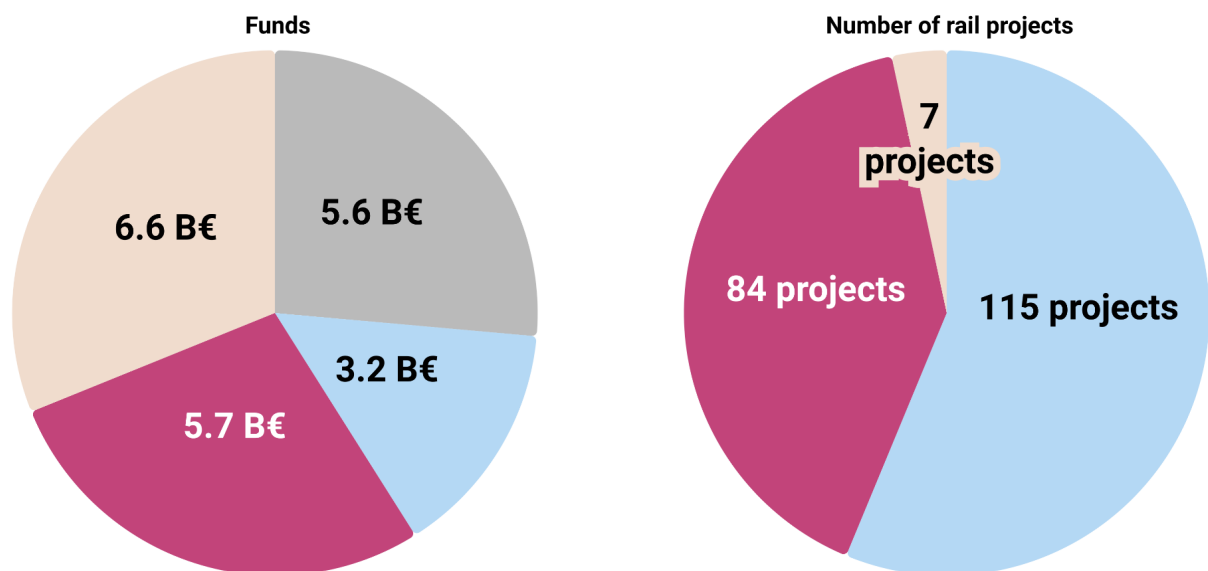
3.1 CEF Transport funds distribution between 2021-2023

As shown in the figure below, between 2021-2023 CEF Transport funds totalled €21.1 billion. During this period, more than 200 rail projects were funded through CEF Transport, for a total of €15.5 billion, which represent more than 70% of CEF Transport funds for this period. The seven flagship megaprojects received €6.6 billion, while €5.7 billion were allocated to 84 key upgrade projects.

Seven rail flagship megaprojects took a third of CEF Transport funds

CEF Transport funds allocation between 2021-2023

Non rail projects Other rail projects Rail key updates Rail flagship megaprojects



Source: CINEA • CEF Transport 2021-2023



3.2 CEF Transport funds are not evenly shared between rail flagship megaprojects and key upgrades

Our analysis showed that a third (31% or €6.6 billion) of CEF Transport funds are allocated to only seven rail flagship megaprojects. The envelope going towards key upgrades looks roughly similar to megaproject funds (€5.7 billion, so 27% of CEF Transport funds). However, key upgrade funds are shared between 84 projects. This implies that on average €70 million were allocated per key upgrade projects, while megaprojects received an average of almost €1 billion per project from CEF Transport between 2021-2023.

With close to €3 billion of funds, Rail Baltica was the most supported project under CEF Transport between 2021-2023. This sole project accounted for close to a fifth of CEF Transport

funds for rail (19%) and is expected to require a similar amount from the next budget due to being delayed until [2035](#).

It is worth noting that several rail flagship megaprojects were also funded by CEF Transport through the previous financial framework (2014-2020), with Stuttgart 21 and the Y Vasca receiving the majority of their funding in that period. The Brenner Base Tunnel and Lyon-Turin tunnel, both absorbing together 10% of the funds, are scheduled for completion by the end of the next MFF. With the majority of the construction work being done by 2028, they will require much less funding in the next MFF, just like Stuttgart 21 and the Y Vasca.

With a single proposal the new Porto-Lisbon line received €800 million from CEF Transport. Since the start of heavy construction is still pending, it is likely that support for this project will also absorb a notable part of the next CEF.

Rail Baltica is the most funded European rail project under CEF Transport

Repartition of CEF Transport funds between 2021 - 2023 among rail flagship megaprojects

Rail flagship megaproject	Funds allocated (B€)	Share of CEF-T funds for rail
Rail Baltica	3.01	19%
Brenner base tunnel	0.95	6%
Lyon Turin tunnel	0.82	5%
Porto Lisbon HSL	0.81	5%
Fehmarnbelt tunnel	0.75	5%
Y vasca		1%
Stuttgart 21		1%

Source: CINEA • CEF Transport 2021-2023



3.3 CEF Transport funds allocated to key upgrades

Between 2021-2023, €5.7 billion were allocated to 84 projects targeting at least one key upgrade (without taking into account flagship megaprojects). As displayed below, our analysis shows that ERTMS was one of the key upgrades receiving the least funds: only €0.7 billion in total for 30 projects. [In our previous study](#) we showed that ERTMS deployment is extremely uneven across member states. Indeed in their [2024 report](#), the European Union Agency for Railways also highlights that despite countries like Luxembourg and Belgium having deployed



ERTMS on a significant share of their network, for most member states less than 20% of their TEN-T lines are equipped with ERTMS.

This low level of investment and this slow pace of deployment is particularly concerning, especially considering that ERTMS is a cornerstone of the TEN-T regulation. Deployment of ERTMS on the entire TEN-T network (Core, Extended Core and Comprehensive) could cost between €24 billion, [according to the Commission](#), to more than €180 billion according to the 2017 report from the [European Court of Auditors](#). Even if these two estimates paint clearly different pictures, the comparison with the €0.7 billion from CEF Transport is striking.

Our analysis also highlights that an overall €3.1 billion was allocated to track electrification. This represents 20% of CEF Transport funds for rail, shared among 33 projects, which makes rail electrification the most funded key upgrade through the current financial framework of CEF Transport. Upgrades of line speeds to a maximum of 160 km/h also received significant funding from CEF Transport, with a total of €2.8 billion (i.e. 18% of CEF Transport funds for rail), shared among 15 projects.

Between 2021-2023, only €0.7 billion was directed to missing links on the HSR network. Among the 12 HSR projects, 10 are related to preliminary studies, highlighting that the infrastructure works for these projects have not started yet. The small amount of HSR projects in the construction phase being funded by the CEF could be a result of the arrival of Next Generation EU funds during these years, that multiple countries used to fund the construction of their HSR projects. Railway infrastructure managers were consistently among the [top recipients](#) of the funds in many countries.

Less than €1 billion from CEF Transport were spent for ERTMS deployment between 2021 - 2023

CEF Transport funds per key update

Key upgrade	Funds allocated (B€)	Number of supported projects	Share of CEF-T funds for rail
Line electrification	3.1	33	20%
Upgrade of line speed (max 160km/h)	2.8	15	18%
Additional tracks	1.8	18	12%
HSR missing links development	0.7	12	5%
ERTMS deployment	0.7	30	5%
Track gauge standardisation		4	1%

Source: CINEA • CEF Transport 2021-2023, excluding flagship rail megaprojects

NB: a single project can include different actions, such as electrification plus track duplication for instance. Hence, the sum of these 6 categories does not equal the total of funds allocated to key upgrades displayed on previous figures



2024 CEF Transport call: A glimmer of hope for ERTMS

In early July 2025, [CINEA published provisional information](#) regarding projects selected for the 2024 CEF Transport call. With the majority of the funds spent already between 2021 and 2023, the 2024 call provided only 2.8 billion euros. This means that 95% of CEF Transport funds under the current 2021-2027 EU Multiannual Financial Framework (MFF) have now been allocated.

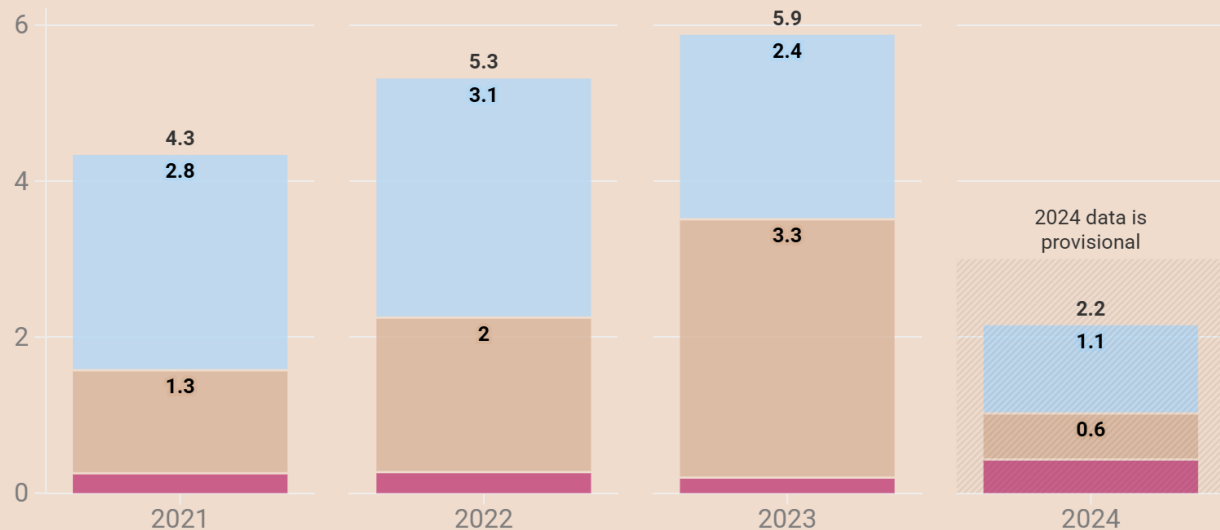
This call shows a notable shift in the share of investments, with ERTMS projects receiving a welcome boost. More than €400 million are provisionally allocated to ERTMS, representing 20% of the funds available for rail under the current CEF Transport call. By comparison, during previous calls, a maximum of 6% of rail funds per year were allocated to ERTMS. These new funds represent a 60% increase of the total ERTMS funding under the current financial framework (with a total of €1.16 billion allocated to ERTMS between 2021 and 2024).

However, even with this boost ERTMS still falls behind other key upgrades and will require stronger funding in future calls. If the Commission follows the more balanced approach of the 2024 call for the next funding period from 2028, ERTMS deployment could finally pick up the pace needed to comply with the targets set out in the TEN-T.

ERTMS funds progressed in 2024 comparatively with previous years

ERTMS projects Rail flagship megaprojects Other rail projects

Funds (€billion)



Source: CINEA • CEF Transport 2021-2024. ERTMS does not include megaproject funds
At the time of publication, only provisional results were published by CINEA for projects selected from the 2024 call



Based on available project descriptions, it's still difficult to determine the exact share of funds allocated to key rail upgrades. However, it's worth noting that significant funds are directed to the completion of missing links on high-speed rail lines on the TEN-T core network. Indeed, more than €290 million has been allocated to the connection between Brno and Přerov in Czechia, located on the cross-border link Ostrava - Katowice (Poland). The focus on high-speed links within member states in Central and Eastern Europe is positive, as currently no country in the region has new high-speed rail lines, despite how developed the network is in Western Europe.

Rail Baltica is the only one of the seven rail flagship megaprojects that received CEF Transport funds in 2024, for a total of nearly €590 million. The current call represents the smallest envelope for rail flagship megaprojects between 2021-2024. This more even funding distribution allows an increased availability of funds for rail key upgrades, as can be seen with ERTMS. However, this trend may be due to the frontloading of CEF Transport funds, which has left a smaller funding pot for the last calls of the current financial framework. As the Commission has to ensure a geographically balanced allocation of funds, there is less funding available per country and only small sized projects can be accommodated.

4. Increasing the reach of the CEF

The CEF has been an instrumental tool for the development of the TEN-T Network. With its focus on cross-border mobility, it is helping to finance missing links that will finally connect the dots to achieve an interconnected network in Europe. Securing its continuity is a must.

But it's also clear that the pace is not at the necessary level to meet the objectives set out in the TEN-T regulation. A reconfiguration of the CEF is needed to provide for a greater coverage of the European network and to respond to future crises.

4.1 What a new CEF 3 should look like

A future CEF 3 should receive a larger budget to reflect the higher ambition that resulted from the revision of the TEN-T regulation. But it should also use those funds more efficiently.

Flagship megaprojects can be very transformative by slashing travel times, reducing operating costs for railway undertakings and improving interoperability. **But they are also generally delayed and overbudget, which means they end up absorbing a large number of EU funds** over time. For instance, the Brenner Base Tunnel has been [delayed](#) by close to 20 years and is now aiming to be completed in [2032](#). Every flagship megaproject suffered significant budget overruns. To illustrate, the European Court of Auditors [reported](#) in 2020 that the Lyon-Turin tunnel had experienced an 85% cost increase over initial estimates. And costs for Rail Baltica are set to more than [quadruple](#) from 5.8 to 23.8 billion euros. Consequently, they are dependent on the CEF for a longer period of time than anticipated, soaking up funds that could have gone to small and medium sized projects that were not able to make the cut.

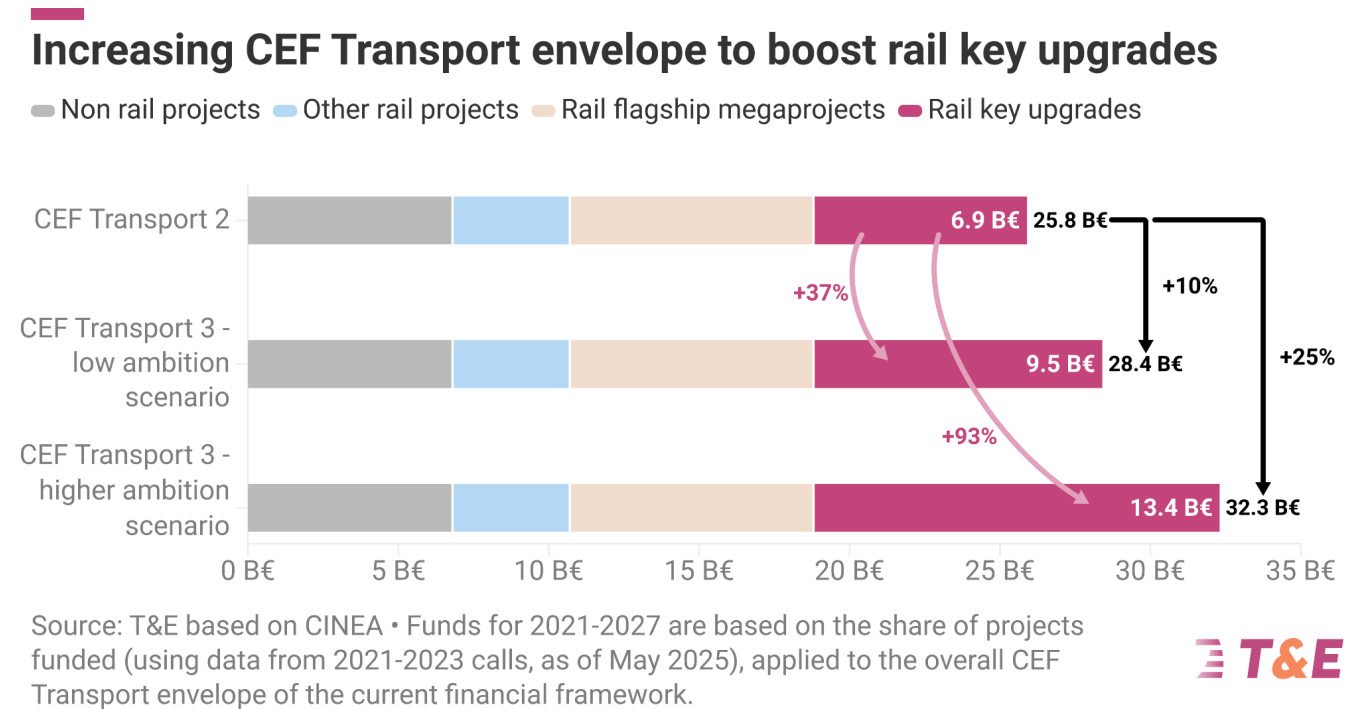
To avoid reproducing this problem, **the EU should make sure that rail expenditure is not so heavily concentrated on just a few projects**. Reducing the proportion of rail spending directed towards flagship megaprojects in the next iteration of the CEF is feasible **without direct cuts to ongoing projects**. As the majority of the megaprojects selected in this study are expected to be either finalised or close to completing their most expensive superstructure works by 2028, the year where the new funds would kick in, they would therefore require less EU co-funding.

But the EU will also need to **ensure that they are not just replaced by new grand megaprojects offering small benefits for international rail despite their high cost**. The new Messina Bridge project has received CEF funds for studies despite its unclear EU added value and lack of cross-border connectivity. [In Sicily](#), 85% of railway lines are single track and only half of them are electrified. Prioritising a bridge that is not expected to have a big impact on the Rome-Palermo connection, as it will still take 7 hours, will not deliver a significant improvement in cross-border mobility and will not address the main issues in the sicilian railway network.

Limiting the amount of funds dedicated to flagship megaprojects can free up funds to boost key upgrades like ERTMS that are in need of a quick acceleration in order to improve safety and

facilitate cross-border travel across the continent. This will result in more short and mid term gains that can benefit Europeans before the CEF’s run is over.

As shown on the figure below, directly allocating more funds to rail key upgrades would also be an efficient solution to accelerate TEN-T development. For instance, increasing CEF Transport budget by just 10% could raise funding for rail key upgrades by a third, or by nearly double if the budget was increased by 25%.



4.2 An instrument fit for the future

The [Preparedness Union Strategy](#) showcases how the EU is aiming to face the threats of unexpected events such as the growing amount of climate disasters or the external security challenges. A potential CEF 3 would have to adjust to the needs of a resilient network. But this cannot be done if a large part of its budget is frontloaded. With more than three quarters of CEF funds having been spent in its first three years, it is currently unable to properly fund the adaptations needed to adapt the infrastructure to the challenges of today.

While frontloading investments makes sense to effectively kick start infrastructure projects, it leaves the CEF vulnerable to unexpected developments. Maintaining a more balanced expenditure throughout the run of the program will help to reinforce the program’s responsiveness.

Rail funds and Military Mobility

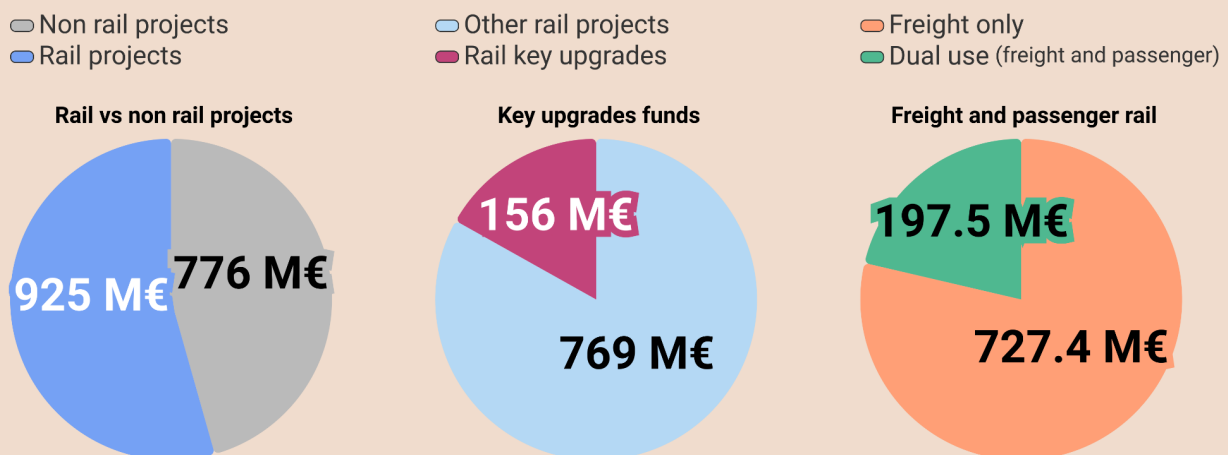
The EU has committed to prioritise infrastructure projects that serve a dual civilian and military use in the next EU budget. Barriers to interoperability and an aging infrastructure have slowed Europe's reaction time to external threats. The objective is to build a resilient network that can accelerate the transport of passengers and military goods across the continent.

Military mobility had its first dedicated calls in CEF 2, but the small budget allocated to them and the urgency to respond to military aggressions led to them being frontloaded and quickly emptied. This explains the strong focus on projects to improve railway intermodality in ports, with few benefits for passenger rail.

Calls for military mobility in a future CEF 3 should be able to integrate longer term projects with a greater added value for passenger rail. For instance, ERTMS did not receive any funding under the military mobility envelope, instead receiving it under the smart and interoperable mobility calls. But its relevance for cybersecurity would justify the inclusion of ERTMS in upcoming military mobility calls provided that additional provisions against cyberattacks are included.

More than half of Military Call funds were allocated to rail projects between 2021 - 2023

Freight and dual use projects (combining passenger and freight rail) are funded through MILMOB



Source: CINEA • CEF Transport 2021-2023



Recommendations

1

Increase the CEF's rail budget to upgrade Europe's cross-border corridors

2

Increase CEF funding for ERTMS projects

3

Rethink how EU funding is attributed to flagship megaprojects

4

New rail flagship megaprojects with limited EU added value should be denied funding from the CEF

5

Less frontloading to ensure there is funding predictability for strategic investments along the period
