# Mobility Transition in Austria's Railway Sector
# Economic Preconditions and Impact

Working Paper

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# 1 Introduction

As one of the most significant contributors to greenhouse gas emissions, the mobility sector represents an important challenge and a critical opportunity for Europe's climate goals and strategic autonomy. With the right policies and strategic focus, it can become a cornerstone of a sustainable, socially inclusive transformation while strengthening Europe's industrial autonomy. In this paper, we aim to address the mobility sector, which remains one of the most significant contributors to greenhouse gas (GHG) emissions, while offering substantial potential for emission reductions Boehm et al., 2021 (cf. European Commission, 2019). Experts such as Wang-Helmreich et al. (2022) and the European Commission (2019) concur that a modal shift towards collective modes of transport, moving away from air travel and individual e-mobility, is essential for a sustainable mobility transition. With its lower emissions and its high potential for electrification, rail transport presents a promising alternative for both passenger and freight movement. Therefore, expanding the transnational railway network becomes critical for achieving European climate goals. Moreover, as a form of public infrastructure, railways help maintain high accessibility to mobility, reducing social inequality, which makes them integral to a broader socio-ecological transformation.

However, to fully meet the extent of rail infrastructure at the scale required to achieve a carbon-neutral economy, many old train systems will need substantial upgrades and expansions. Another central challenge is the national fragmentation of the Trans-European railway system, especially with regard to limited cross-border compatibility. Although these issues have been discussed in the EU since the 1990s, real progress has been slow. Only recently, with 2021 being designated the "Year of Rail" by the European Commission (ibid.), political interest in railway expansion has gained traction. Yet, considering the current state of much of Europe's rail infrastructure, this shift in focus is urgently needed. Nevertheless, transitioning to rail transport remains a core element in most plans for socio-ecological transformation, making immediate action at both national and EU levels critical.

The European mobility transition unfolds within a rapidly changing socio-economic and geopolitical landscape. While the EU has ambitious climate targets, such as the European Green Deal and the Net Zero Industry Act, and aims to become the first climate-neutral continent by 2050 Commission, 2024, it faces increasing global competition – especially from China (Pindyuk, 2023). The rise of interventionist policies, such as industrial strategies (Millot and Rawdanowicz, 2024), reflects a shift in how global powers like the EU and China approach economic and technological leadership.

China's dominance in the electric vehicle (EV) market is a crucial area of competition, and the European Commission's competitiveness agenda focuses heavily on EVs, partly in response to China's overwhelming influence in this sector. However, it is essential for the EU to also prioritize railway infrastructure for several key reasons.

This has led to a broader debate about the scope of Europe's mobility transition, with the definition of "green mobility" becoming increasingly contested. While EVs are prioritized, other areas of the transport system – such as railway infrastructure – are not receiving equivalent attention despite their potential benefits. Expanding the railway system and its supplying industries could provide substantial value-boosting employment, strengthening industrial linkages, and supporting climate goals. However, the focus on electric vehicles, driven by competitive pressures from China, may be limiting Europe's ability to fully promote and develop a comprehensive mobility transition that includes rail infrastructure. This raises the question: why is the expansion of the European railway system, which could be a powerful tool in the EU's green agenda, not receiving the support it deserves?

In this paper, we aim to analyze the question of how the expansion of the European railway infrastructure could contribute to the Austria's climate goals, socio-economic development, and industrial competitiveness, in light of global competition from China and the prioritization of electric vehicles. We thus aim to create a holistic picture of the potential and possible challenges of this transition. Austria is a relevant case for this topic for at least three reasons.

- First, Austria's central location within Europe makes its role in any trans-European railway strategy critical.
- Secondly, the Austrian Railway company ÖBB and the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (FMC) have created a detailed plan for Railway infrastructure investment in the railway sector until 2040. This plan includes significantly more information than is available for other European countries.
- Third, Austria has a railway infrastructure manufacturing sector that is, although often overlooked in the European context, substantial relative to the Austrian GDP.

## 2 Economic effects of investments in railway infrastructure

In the literature, there are a large number of input-ouput (IO) applications on investments in the transport sector (Kapeller et al., forthcoming). The relative simplicity and transparency of the IO modeling framework render IO models especially feasible for drawing policy implications, making it a popular tool for policymakers (Yu, 2018). As a result, beyond numerous academic studies, there is also an extensive collection of policy briefs and technical reports that employ IO methodologies to assess the economic impacts associated with the expansion of transport infrastructure.

However, with only a few notable exceptions, the majority of these studies are conducted at the national level. This trend can be attributed not only to the more accessible and comprehensive data provided by national accounts but also to the prevailing perception of transport infrastructure as a predominantly national concern(Kapeller et al., forthcoming).

Before elaborating further on the advantages and limitations of IO modeling within the context of the transport sector, it is worth pointing out the sector's unique characteristics. In many countries, at least a part of transport infrastructure is financed publicly Bank, 2009. While public investment can usually increase short-term employment and has positive multipliers, the long-term economic effect of public expenditures has been subject to heated debates in the past. However, there seems to be a large consensus that investments in the transportation sector have positive economic effects beyond the short-term. For example, infrastructure expansions typically result in increased utilization and traffic volumes, which in turn stimulate additional economic activities. Consequently, it can be expected that an expansion of the transport infrastructure will have longer-term, cumulative benefits that surpass the initial, short-term economic effects of the investment (see Bhatta and Drennan, 2003, for a literature review on the subject).

What is more, by facilitating the shift from relatively resource-intensive road traffic to rail traffic, such investments contribute to a reduction in greenhouse gas (GHG) emissions, aligning with climate policy goals. Moreover, promoting the use of public transport over individual vehicles addresses broader social objectives. It enhances mobility access for underrepresented groups such as the elderly and minors, and makes transportation more affordable for lower-income households. Thus, a shift towards more public transport not only supports environmental sustainability but also aligns with the social imperatives of a socio-economic transformation Sims et al., 2014.

Studying transport infrastructure within an IO framework offers several distinct advantages. One of the primary benefits is the relative simplicity of IO models, making them straightforward to apply Yu (2018). IO models are particularly effective for understanding the interconnections between sectors in an economy, allowing for a comprehensive analysis of how changes in transport infrastructure can ripple through other industries. This capability makes IO models a powerful tool for assessing the broader economic impacts of transportation-related investments, such as changes in employment, value added, and overall economic output. Additionally, due to their accessible modeling structure, IO models are a popular tool for informing policy decisions, offering valuable insights into how investments in one sector—such as transport—can influence the economy at large.

However, while IO models offer valuable insights, they are not without limitations.

**Displacement effects.** The mobility transition will not only entail an expansion in railway infrastructure but also a reduction in road infrastructure, and, ideally a decrease in demand for cars with combustion engines. While the former can be straightforwardly be implemented in an IO framework, the latter is a challenge. To answer questions such as whether freed-up labor in the automotive sector can be easily transferred to the railway sector, or whether positive employment effects of the railway expansion will outweigh the downturn in the automotive industry, it is necessary to look beyond traditional Input-Output (IO) models..

**Sector selection.** Another limitation concerns the question of *which* sector the investment should target. Product classifications within IO tables are aggregated, which can obscure sector-specific impacts. For example, in Austria, railroad construction is subsumed in the sector "civil engineering" that also entails road construction. To illustrate, Austria's road network has a length of approximately 128.300 kilometers (Statista, 2024a), while its rail network is significantly smaller at just approximately 5.600 kilometers long (Statista, 2024b). That is, if an investment into railway infrastructure is assigned to "civil engineering", he resulting analysis may predominantly reflect the impacts of road construction rather than rail, as rails are very likely not significant of the entire sector.

To address this issue, costs could be split up more granularly and assigned to different sectors. However, such an approach necessitates highly detailed technical knowledge of the production processes involved, which can be challenging to obtain. This is a problem that many existing studies face when analyzing sector-specific impacts of infrastructure investments. This is a problem that many existing studies face.

For instance, Dwiatmoko et al. (2020) present an IO model comparing investments across various transportation sectors. Their findings suggest positive effects on employment and wages in the railway sector, with a multiplier effect of 1.6. However, the study does not provide detail regarding sector classification, leaving ambiguity around what specific activities are included within the "railway sector." This lack of clarity hampers the ability to fully understand the sectoral impacts of the investment.

Similarly, Keček et al. (2022) examine an IO model for different transport sectors in Croatia. Using two separate datasets, they observe that sector multipliers generally declined between 2010 and 2015, which they attribute to Croatia's increased economic integration following its accession to the European Union. Notably, the authors emphasize that Croatia's railway infrastructure lags behind other EU nations and advocate for higher investments in this sector, not only for economic reasons but also to meet environmental objectives, particularly given the already high utilization of the road network. However, the study does not disaggregate the railway and road transport sectors, limiting the precision of the results.

**The role of imports.** In countries where procurement regulations may dictate whether investments are directed toward domestic firms or international suppliers, it is likely that assigning the full expected cost of investment to national tables will lead to an overestimation of economic effects. To tackle this challenge, Farooq et al. (2008) conduct a sensitivity analysis to test their assumptions and Doll and Schaffer (2007) compute different extreme scenarios to create a "corridor effect", a range within which the actual result will likely located.

## 3 The case of Austria

To tackle the mobility transition in Austria, and in line with the EU's climate goals and traffic guidelines, the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (FMC) define a mobility "master plan" in which the focus lies on the substitution of individual by public transport (FMC, 2021) . Based on this, the FMC, the ÖBB-Infrastruktur AG (ÖBB-Infra) and the Schieneninfrastruktur-Dienstleistungsgesellschaft mbH (SCHIG mbH) a target network for the rail expansion in Austria (FMC et al., 2024). Here, the primary goal is to expand and develop the train infrastructure in Austria in order to ensure shorter travel times and better accessibility in both passenger and freight transport.

In an accompanying study Berrer et al. (2024), inter alia, calculate economic effects of this target plan using an input-output framework. The authors estimate the costs of the entire target network to be 19.9 billion euros, based on the 2022 prices. Of this, nearly €19 billion will have a value-added effect. While the authors attribute all construction activity is attributed to Austria, they expect 17% of the investment to be imports. This decreases the amount invested in Austria to 17.3 billion euros. Based on their IO model, the authors expect this investment to generate a real gross value-added effect of €14 billion across Austria. Of this, €6.7 billion will be generated directly by the contracted companies, with an additional €7.3 billion through their supply chains and induced consumption. In terms of employment, the investments are expected to secure or create around 165,000 full-time jobs for one year.

The authors also implement a multi-regional input-output (MRIO) model. Their results show that the most significant beneficiaries are expected to be the most populous and economically strong states, namely Upper Austria, Lower Austria, Vienna, and Styria. Following them is Tyrol, while the remaining states show a significantly larger gap in terms of benefits.

## 4 Beyond Input-Output: Challenges for Industrial Policy

The European mobility transition, aimed at addressing one of the largest greenhouse gas (GHG) emission-producing sectors, is evolving in a complex socio-economic and geopolitical context. With the European Green Deal and the Net Zero Industry Act, the EU has committed to becoming the first climate-neutral continent by 2050 Commission, 2024. Achieving these targets and growing geo-economic competition, particularly from China, has set the table for a change in how leading experts in the EU are thinking about industrial policies (Pindyuk, 2023). One sector with immense potential for emission reductions is the railway industry, which offers low-emission solutions for both passenger and freight transport. The expansion of railway infrastructure has the dual benefit of aligning with European socio-economic goals, including job-creation and advancing the continent's climate goals.

Input-output models are instrumental in illustrating the positive economic effects that investments in one sector can create throughout the economy and thereby in showing that investment in public infrastructure is beneficial for the overall economy. However, they are not necessarily able to solve the challenges of the transformation itself.

One of the institutional challenges for this transition is rooted in the European Union's regulatory and competitive framework, which was created before the EU newly discovered its interest in interventionist industrial policies. The regulations were thus created with a strong focus on fostering open markets, preventing monopolistic dominance, and ensuring a level playing field across member states. However, this approach often clashes with the growing need for more interventionist industrial policies, which aim to strengthen strategic sectors in the face of global competition Nebbia, 2022. The prohibition of Siemens's acquisition of Alstom, intended to prevent monopolistic dominance, is one example where competition rules have complicated the consolidation of the European rail industry (MEF- Ministère de l'Écologie, 2024). Siemens, a German multinational engineering giant, specializes in rail and transportation systems through its Mobility division, producing high-speed trains, rail automation, and intelligent transport solutions. Alstom, a French multinational, is known for its expertise in rolling stock, signaling systems, and integrated rail infrastructure solutions. The merger aimed to create a ”European rail champion” capable of competing globally, particularly with China's CRRC, but was blocked by the EU over concerns about reduced competition in the European high-speed rail and signaling markets.

Meanwhile, China's dominance in the global rail supply market is growing. Companies like China Railway Rolling Stock Corporation (CRRC) are putting significant pressure on European suppliers, who are traditionally leading the global market. A recent example of this competition was the withdrawal of CRRC from a Bulgarian tender after an EU probe into subsidies Euractiv, 2024, highlighting both the competitive threat and the complexities of maintaining fair competition in the sector. The sector's strong interconnections with other industrial fields make it a crucial area for achieving a ”green recovery” that aligns with climate targets and guarantees economic stability economic resilience. As a result, the discourse around industrial policies in the EU is changing in the last years. The Franco-German manifesto advocates for a new approach to European industrial policy fit for the 21st century, and underscores the importance of fostering industries that are both globally competitive and strategically independent (MEF- Ministère de l'Écologie, 2024).

While traditional industrial policy tools like IO models provide valuable insights into sectoral linkages and economic impacts, they alone are insufficient for understanding the full scope of challenges Europe's railway sector faces in the context of its industrial transformation. As shown in the previous paragraphs, regulatory frameworks and geopolitical pressures also affect the feasibility of transition strategies. On an issue as complex as the mobility transition, it is therefore crucial not to rely too heavily on a single type of analysis but to instead combine the insights of a wide array of methods. Focusing solely on IO frameworks would limit the ability to capture the more dynamic and qualitative aspects necessary for developing effective industrial policy.

## 5 Conclusion

The European mobility transition presents an immense challenge and an opportunity to align climate objectives with industrial and socio-economic transformation. As highlighted throughout this paper, railway infrastructure is uniquely positioned to play a pivotal role in this transition due to its lower emissions and social accessibility benefits. However, the shift towards an expanded rail network is not without significant obstacles, including outdated infrastructure and the dominance of electric vehicles in the EU's current competitive strategy. While Input-Output (IO) models offer valuable insights into the economic ripple effects of infrastructure investments, such as job creation and value-added benefits, these models alone cannot fully address the complexity of the transition, particularly when considering displacement effects in sectors like the automotive industry. Furthermore, broader geopolitical and regulatory challenges, such as China's growing dominance in the global rail supply market and the EU's competition rules, complicate efforts to consolidate the European rail industry. In the case of Austria, the potential benefits of a robust railway expansion are clear, with significant value-added effects and job creation, as demonstrated by recent studies. Yet, to fully unlock this potential, a multi-faceted approach beyond traditional economic models is essential. An approach like this needs to include industrial policies that foster strategic sectors, greater granularity in sectoral investment analysis, and a focus on reducing import dependencies. Through such comprehensive strategies, Austria can achieve its dual objectives of climate neutrality and industrial resilience, with the railway sector as a cornerstone of this socio-ecological transformation.

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