

WHU Campus for Sustainable  
Transportation 2025

# Impulses for future-proof Road and Air Freight

October 2, WHU Campus Düsseldorf



Discussion results: **Priorities for  
industry-academia collaboration**

October 2025, Düsseldorf

**WHU**   
Otto Beisheim School of Management

CAMPUS FOR  
SUSTAINABLE  
TRANSPORTATION

## FOREWORD

Hosted at WHU Campus Düsseldorf, the inaugural Campus for Sustainable Transportation convened executives, industry experts, start-up founders, researchers, and MBA/Master's students at the intersection of **sustainable Road and Air freight**. Beyond keynotes, panels, and networking, the centerpiece was the interactive **Science-meets-Business** format: two rounds of co-moderated sessions, each pairing researchers with practitioners, to connect strategic horizons with operational realities. Short impulses introduced promising solutions and state-of-the-art research, followed by an open exchange to stress-test ideas. Each group prioritized opportunities for **industry-academia collaboration**. The key outcomes were synthesized and are documented in the following.

## ABOUT WHU

**WHU – Otto Beisheim School of Management** is a leading German business school with an exceptional national and international reputation. WHU offers academic programs and continuing education for executives throughout their career. Founded in 1984 on the initiative of the Koblenz Chamber of Commerce and Industry, WHU has become a model for future-oriented research and teaching in business economics. WHU is synonymous with “Excellence in Management Education”, which it pursues in the following three core areas of activity: academic programs, research, and knowledge transfer in general management. WHU's graduates, research and fruitful collaboration with business partners demonstrate the school's success in achieving its mission.

## ABOUT THE CHAIR OF LOGISTICS MANAGEMENT

Logistics has become a key enabler in today's global trade. And while today's value creation networks exploit to the extent possible local business advantages, the challenges that come with these dispersed structures have grown substantially over the years. The objectives of the chair are to generate new insights for the management of logistics and to disseminate this state-of-the-art knowledge into the research and business community. To this end, we conduct high quality and internationally visible research, which tackles sustainability challenges and sheds light on data-driven decision making in supply chains.



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# 1. WHAT DOES IT TAKE TO DECARBONIZE ROAD AND AIR FREIGHT, WITHOUT LOSING COMPETITIVENESS?

The case for action is clear: with seven out of nine planetary boundaries having been breached as of 2025, decarbonization efforts must be accelerated. This is particularly true for the transportation sector which, in the EU-27, accounts for 26% of CO<sub>2</sub> emissions across all industrial sectors and thus represents the biggest share. Globally, road and air freight, which are the focus of this report, account for roughly one third of these transport-related emissions (see Fig. 1).

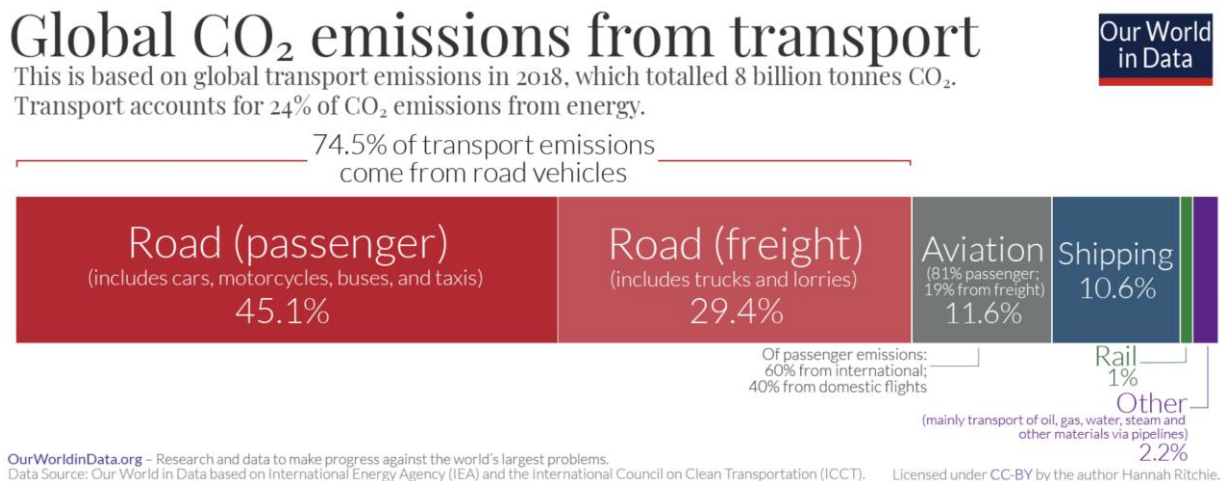


Fig. 1: Transport-related CO<sub>2</sub> emissions on a global level (Source: Our World in Data, 2020)

Freight transport is the backbone of the global economy, demonstrating continuous growth. However, over the past two decades, its decarbonization has been more than three times slower than the rest of the EU economy. Consequently, its relative emission share has increased. To avoid missing the net zero target by 2050, sustainability pioneers with truly innovative approaches are needed.

To help close this gap to net zero and address the question of how to decarbonize road and air freight while maintaining competitiveness, the WHU Campus for Sustainable Transportation convened keynotes, discussions, and a panel that synthesized the current state of the art into five main topics:

First, industry should **double down on proven low-carbon technologies**. Effective solutions have become available at scale, such as battery-electric trucks, sustainable aviation fuel (SAF), and the newest fuel-efficient trucks and next generation cargo aircraft. The focus should be on investment that shortens the lag from pilot to scale while transition options are rigorously validated. Academia can play a key role by quantifying the implications of investment choices through simulation and scenario modeling, thereby providing decision support for management in the face of technical, geopolitical and regulatory uncertainty.

Second, **infrastructure** should be treated **as the key enabler** that determines the pace of the transition. The overall speed is constrained by the build-out of charging and grid capacity and by the availability of reliable supply chains of SAF.

Academia can support site identification based on future demand scenarios, capacity and peak-load electricity modeling, and provide evidence to streamline approval processes and reduce bureaucracy where possible.

Third, **short-term efficiency gains** are both feasible and material, allowing emissions to fall while costs are reduced. Operational improvements include increased truck utilization through optimized route planning, eco-driving training to lower fuel consumption, and reduced aircraft turnaround times. Academia brings operations-management methods to design, test, and scale what works.

Fourth, to **compete through the transition**, decisions must pay off over time while safeguarding operations and delivery windows. Transition phases require cash outlays, and a disciplined approach to total cost of ownership (TCO) and inherent risk is required. Academia can provide TCO and uncertainty models to guide fleet renewal, investment roadmaps, charging strategies, and SAF procurement contracting.

Finally, **data-driven decisions** are essential amid persistent regulatory, geopolitical, and technological **uncertainty**. Questions around toll exemptions, certification processes, and rapid technology shifts will remain. Rather than waiting, real-time execution data should be leveraged now, with academia contributing the analytics and frameworks required to turn data into action.

But what does this mean in practice, for propulsion choices, route planning, SAF supply and demand, charging infrastructure or carbon data management? To translate these high-level topics into implementable priorities, we paired researchers and practitioners across road and air freight in “Science-meets-Business” sessions. The next chapter summarizes the resulting priorities for joint industry-academic work in each area.

## 2. KEY DISCUSSION RESULTS: PRIORITIES FOR INDUSTRY-ACADEMIA COLLABORATION

Discussions during this year's WHU Campus for Sustainable Transportation centered on the strategic horizon and the operational realities of sustainable road and air freight. In interactive "Science-meets-Business sessions," **priorities for joint industry-academia collaboration** were set, of which the most important ones are presented in Fig. 2 for road freight, and Fig. 3 for air freight.

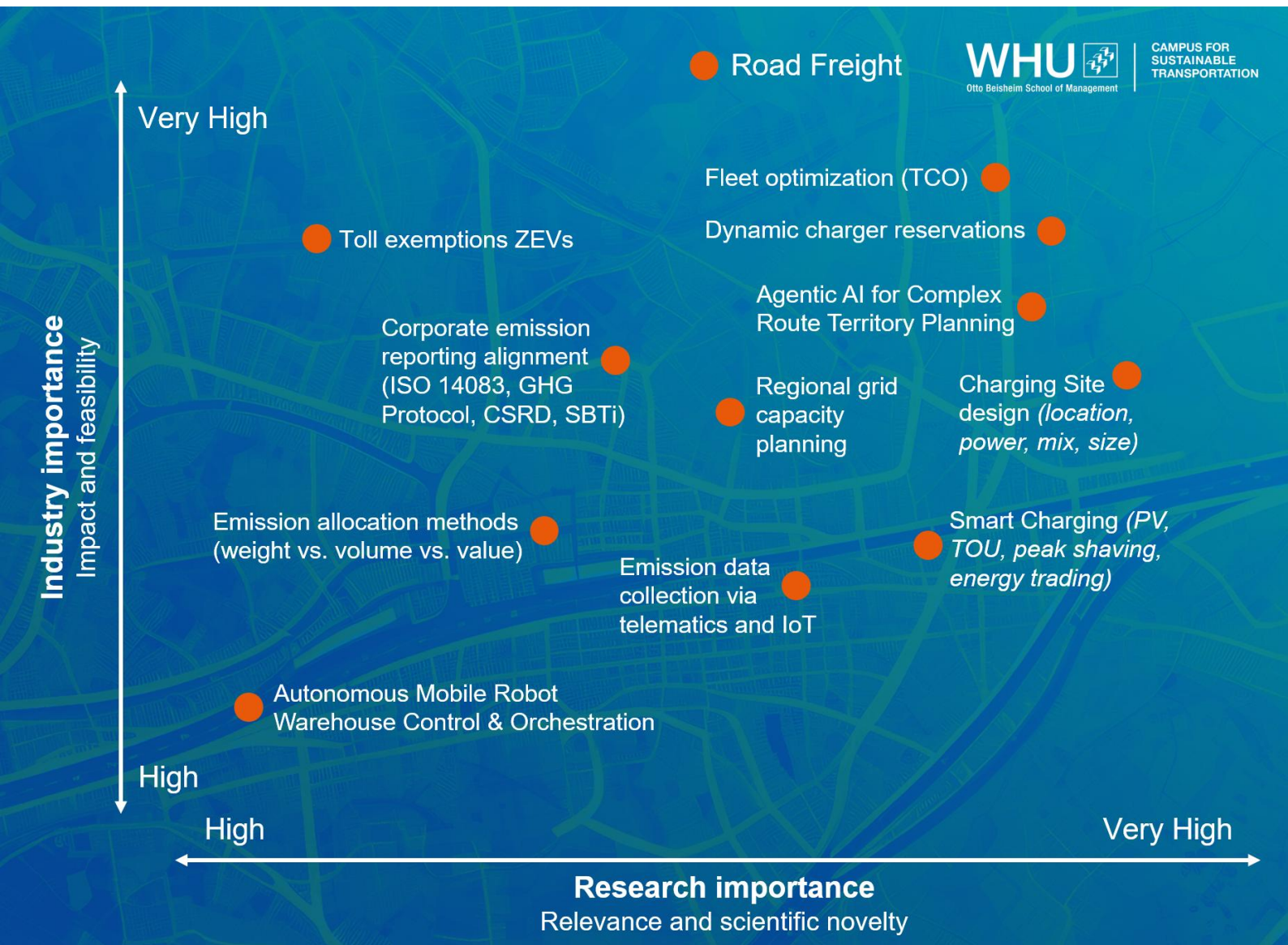


Fig. 2: Priorities for joint industry-academia collaboration: Road Freight

Fig. 2 illustrates a range of fruitful collaboration opportunities between industry and academia in **road freight**, where industry brings data and information on real-life constraints to the table, to be matched by rigorous modeling by researchers. Some examples are supposed to illustrate the approach: first, consider Fleet Optimization from a TCO perspective. The practitioner involved would provide information on existing route characteristics such as length and travel times, current and future fleet

characteristics, and available cost data pertinent to the modelling endeavor. The researcher will assist in determining key risks, such as about future technologies or regulatory pathways and jointly generate scenarios to quantitatively assess use cases. Close cooperation will enable the industry partner to include the decision support into their tool set.

As another example, consider Charging Site Design: the industry partner will provide estimates on, say, geographic data, required power across different timeframes, expected fleet size and loading patterns. Research can then assist by determining an optimal charging network, accounting for example for private, semi-private and public charging opportunities and associated flexibilities, and quantifying expected power prices which will be an important ingredient to the TCO equation.

Fig. 3 presents the key topics that were identified as being of high importance to the **air freight** industry and highly relevant to research.

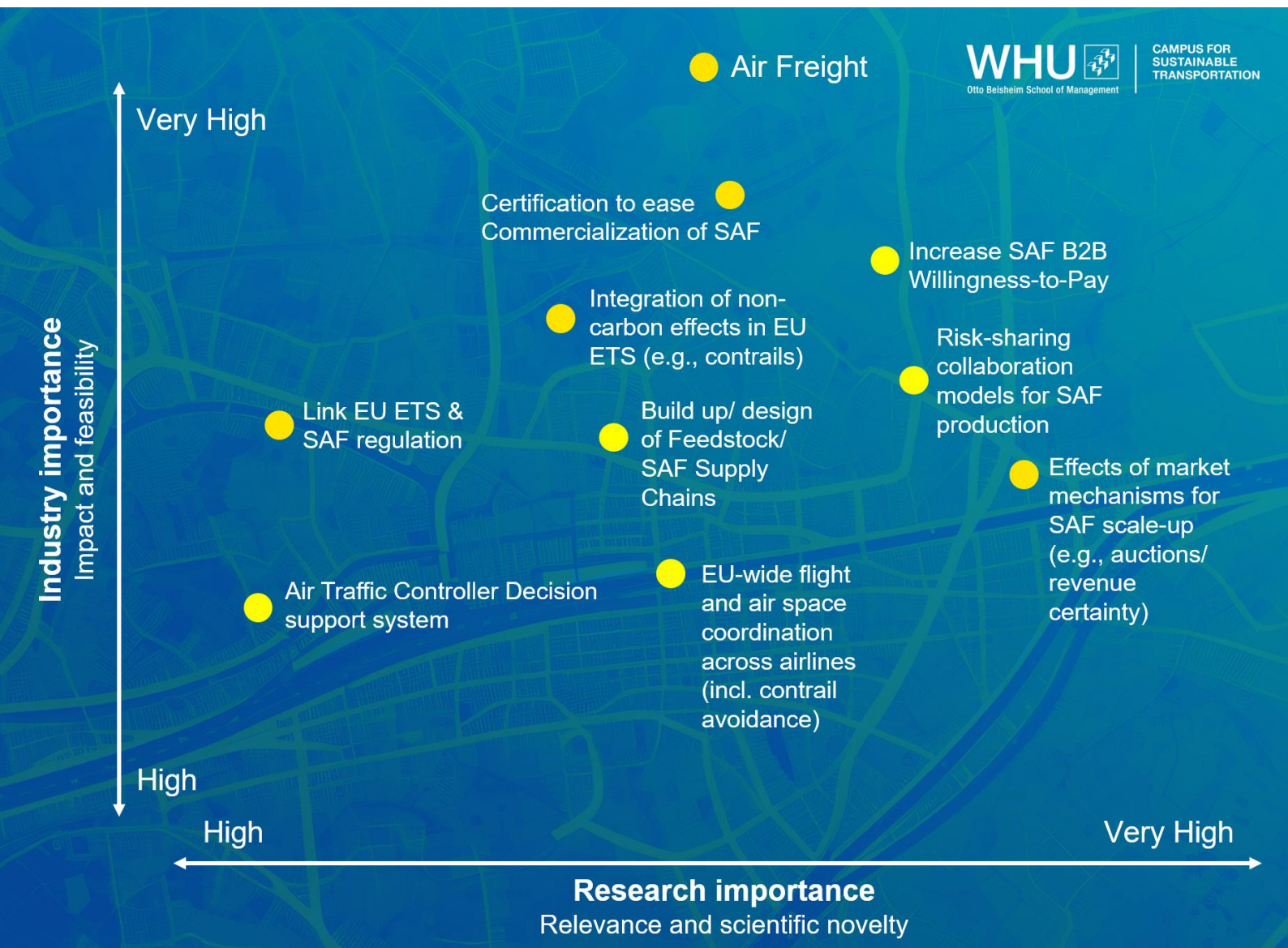


Fig. 3: Priorities for joint industry-academia collaboration: Air Freight

For example, freight logistics customers' willingness to purchase SAF can still be significantly increased. Due to a lack of transparency, many customers still lack confidence in the CO<sub>2</sub> savings effect of SAF, and Scope 3 certificates do not clearly distinguish between SAF and offsetting. Science can help here by using statistical market research to measure the added value of corresponding product measures and communication.

In addition, there is also great potential for optimization in airspace monitoring. Better integration of individual airlines' flight planning with European airspace allocation by Eurocontrol could, on average, lead to significantly shorter flight routes in European airspace with the help of new AI-based simulation methods. This potential should be realized urgently, as extreme weather events or other airspace restrictions, e.g., due to military exercises, further complicate flight route allocation and thus worsen the climate footprint. Science can make a decisive contribution in this area with problem modeling and the application of state-of-the-art simulation methods.

### **3. SO WHAT IS NEXT?**

Taken together, these priorities show that the sustainable transformation is picking up speed, as it must, even if sustainability is not always at the top of the list of talking points right now. We are convinced that a successful transformation requires collaborative approaches between academia and the stakeholders in the logistics industry, best practice sharing among companies that might be at different stages of their transformational journey, and the provision of thought leadership from start-ups and research. WHU intends to act as the premier platform for such an exchange and collaboration – we invite you to be part of this and get in touch to discuss further:

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You can also visit the website of the [Chair of Logistics Management](#) to learn more.