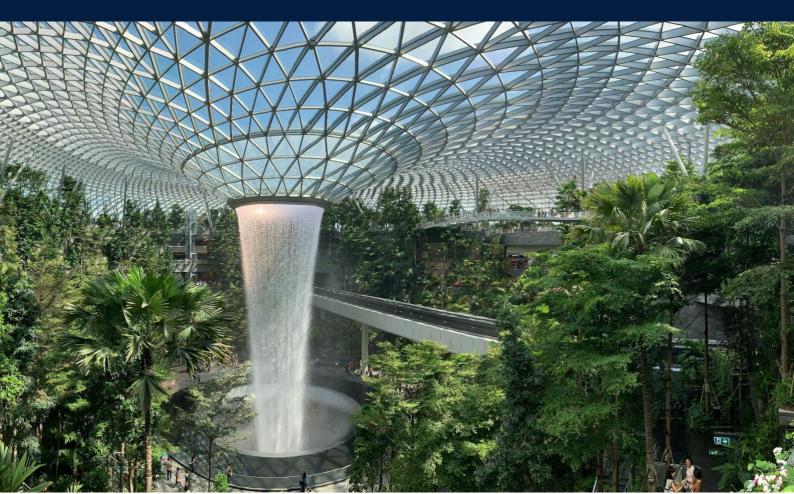# Climate Transition Plans' Assessment in Hard-to-Abate Sectors: Evidence from Airlines

Executive Summary

José Luis Reséndiz, Gireesh Shrimali

March 2025

The Smith School of Enterprise and the Environment (SSEE) was established with a benefaction by the Smith family in 2008 to tackle major environmental challenges by bringing public and private enterprise together with the University of Oxford's world-leading teaching and research.

Research at the Smith School shapes business practices, government policy and strategies to achieve net-zero emissions and sustainable development. We offer innovative evidence-based solutions to the environmental challenges facing humanity over the coming decades. We apply expertise in economics, finance, business and law to tackle environmental and social challenges in six areas: water, climate, energy, biodiversity, food and the circular economy.

SSEE has several significant external research partnerships and Business Fellows, bringing experts from industry, consulting firms, and related enterprises who seek to address major environmental challenges to the University of Oxford. We offer a variety of open enrolment and custom Executive Education programmes that cater to participants from all over the world. We also provide independent research and advice on environmental strategy, corporate governance, public policy and long-term innovation.

For more information on SSEE please visit: www.smithschool.ox.ac.uk

Acknowledgements

Abstract

As industries navigate the transition to net-zero emissions, aviation faces unique challenges balancing growth with decarbonisation. With air travel demand expected to triple by mid-century and limited near-term alternatives to fossil fuels, credible climate transition plans are essential—yet robust assessment tools remain scarce. This study introduces a correlation-based scoring framework to evaluate airline transition plans using data from 84 airlines, representing 75% of industry emissions. Key plan components (foundations, implementation, engagement, governance, and metrics) were coded into binary indicators and weighted based on their empirical correlation with short-term carbon performance, controlling for confounders like fleet age and passenger load. Results show that implementation strategies for new aircraft technologies and foundational climate targets show the strongest associations with emissions reductions. Governance mechanisms, while weaker in direct emissions impact, enhance plan credibility through accountability and alignment with standards, influencing long-term strategic outcomes. Our framework offers a scalable, data-driven approach that can be adapted to other hard-to-abate industries, enhancing regulatory oversight and investor accountability.

Keywords: climate transition plans, aviation, climate mitigation, net zero, sustainability transition, sustainability reporting.

Correspondence: jose.resendiz@smithschool.ox.ac.uk

Executive summary

Overview

We provide a novel quantitative assessment of airlines' transition plans. In the race to achieve net-zero emissions, hard-to-abate sectors such as aviation face a triple challenge: rising demand, technological uncertainty, and intense pressure to decarbonise. Traditional methods for evaluating corporate climate transition plans (CTPs) are often based on subjective expert judgement and generic benchmarks, making it difficult for investors and policy makers to assess whether disclosed strategies truly reduce emissions. This study introduces a novel, correlation-based scoring framework that quantitatively assesses the credibility of airlines' CTPs by linking specific plan components to short-term carbon performance.

Methodology and Data

Our framework is built around a structured questionnaire that identifies 12 critical sub-elements of effective transition planning. We derive empirically based weights by statistically correlating the presence of each element with short-term changes in emissions intensity (measured as CO_2 per revenue passenger-kilometre). Recognising that transition planning is still an emerging and largely voluntary practice—with limited historical data—our analysis focuses on short-term outcomes. Data from 84 airlines, which represent approximately 75% of global aviation emissions, form the basis of our robust analysis. Techniques such as stratification and partial correlation are employed to account for confounding factors like fleet age and passenger load, ensuring that the derived weights accurately reflect the strategic impact of each component.

Key takeaways

We derive transition levers using a comprehensive review. Our framework is grounded in aviation climate pathways, which highlight critical decarbonisation levers such as sustainable aviation fuels (SAFs), new aircraft technology, and operational improvements. These levers were selected based on comprehensive reviews of global climate pathways (e.g., IEA, MPP, OECM, ICAO) and are derived from the essential strategies that underpin effective sector-wide

decarbonisation. This justification ensures that the transition levers incorporated into our scoring system reflect both scientific consensus and practical relevance in aviation.

We derive weightings of sub-elements using quantitative methods. Our methodology employs three correlation approaches to derive the weights for the 12 key sub-elements identified in our structured questionnaire.

- The baseline correlation approach calculates the point-biserial correlation between each binary sub-element and the proportional change in emissions intensity (CO_2 per revenue passenger-kilometre) without adjusting for external factors, providing a direct measure of association.
- The stratified correlation approach accounts for confounding effects by grouping airlines into quantile-based bins based on operational factors such as fleet age and passenger load, ensuring that correlations are calculated within comparable subgroups.
- The partial correlation approach further refines the analysis by statistically controlling for these operational factors as continuous variables, isolating the independent contribution of each sub-element to emissions performance.

Investments in fuel-efficient aircraft technology and robust governance mechanisms are key. Across all three methods, investments in fuel-efficient aircraft technology and robust governance mechanisms, such as independent third-party verification, consistently receive higher weights, indicating a strong association with lower emissions intensity. In contrast, stakeholder engagement and detailed metric disclosures tend to have moderate weights, reflecting their supportive but less immediate impact on decarbonisation. As illustrated in Figure 1, these findings provide a comprehensive understanding of how different components influence short-term emissions outcomes, offering an evidence-based foundation for prioritising corporate strategies and policy interventions.

Figure 1.⸺ Derived Weights of Climate Transition Plan Sub-Elements Across Correlation Methods

Source: Authors' analysis.

Note: This figure visualises the weights assigned to sub-elements of climate transition plans across three correlation-based methods: Baseline, Stratified, and Partial. Weights represent the relative importance of each sub-element (as a percentage) in influencing short-term carbon performance change. Darker shades indicate higher weights, highlighting the sub-elements that exert the strongest influence on emissions performance. Sub-elements are categorised under Climate Goals, Fuels, Technology, and Operations to reflect their functional areas.

We derive airline-focused scores using these weightings, clearly separating high-performers. Our analysis of 84 airlines, representing approximately 75% of global aviation emissions, highlights clear disparities in climate transition planning.

- High-scoring airlines, such as JetBlue Airways, Aer Lingus, Iberia, and Azul, distinguish themselves with comprehensive disclosures that integrate robust operational,

foundational, and governance measures. Their commitments—like JetBlue's net-zero pledge by 2040 and Iberia's and Aer Lingus's 10% Sustainable Aviation Fuel (SAF) target by 2030—are backed by investments in emerging technologies such as hydrogen and electric aviation. While some top performers, including Delta and Air France-KLM, exhibit occasional gaps in governance or foundational disclosures, they maintain transparent, data-driven approaches that align with evolving regulatory and investor expectations.

- In contrast, airlines scoring near zero, such as Kenya Airways, VietJet Air, and Juneyao Airlines, lack robust transition plans, with disclosures that remain largely narrative-driven, minimal quantifiable targets, weak governance structures, and limited engagement with decarbonization technologies. The absence of external validation and operational detail raises credibility concerns, suggesting these airlines may struggle to align with net-zero 2050 ambitions—potentially limiting their access to capital and weakening their competitive standing in a market increasingly shaped by climate commitments.

Compared with existing frameworks, our framework reduces subjectivity. In comparing our correlation-based system with established methodologies such as ACT (Accelerate Climate Transition) and TPI (Transition Pathway Initiative), our framework stands out by reducing subjectivity through empirical weighting. While ACT and TPI incorporate qualitative assessments and process maturity evaluations, our method directly links disclosure elements to measurable short-term emissions outcomes. This focus on data-driven results—coupled with robust techniques to control for operational confounders—provides a transparent, replicable approach that distinguishes itself from other assessment tools.

Our framework has significant policy and investment utility. The practical implications of our framework are significant for both policy makers and investors.

- For regulators, the insights derived from our analysis can inform targeted policies that incentivise comprehensive and transparent climate disclosures.
- For investors, our approach offers an objective, quantifiable metric for assessing the decarbonisation readiness of airlines, thereby reducing the risks associated with climate transition.

- Furthermore, while our framework serves as a robust standalone tool, it can be effectively complemented by qualitative assessments and longitudinal analyses to provide a fuller picture of long-term decarbonisation trajectories.

Conclusion

In summary, our correlation-based scoring framework delivers a transparent method to assess the credibility of airlines' climate transition plans. By linking key strategic components to short-term carbon performance, the framework not only addresses the current limitations of voluntary climate disclosures but also offers a scalable model that can be adapted to other hard-to-abate sectors. This integrated approach supports more informed decision-making by investors and policy makers, paving the way for a more resilient and accountable low-carbon future.