Case Study: Scope 3 Emissions from Engine Transportation

Abstract

This case study investigates the Scope 3 emissions associated with the transportation of a V2500 engine over a 20-year lifecycle. Using DEFRA (UK's Department for Environment, Food, and Rural Affairs) guidelines, the study quantifies the emissions generated during routine engine movements by land and sea. Results show that transporting the engine produced 1,854 kilograms of CO2e, equivalent to the carbon absorption capacity of 75 trees in one year. These findings underscore the critical need for sustainable logistics strategies in aviation leasing and highlight opportunities for reducing hidden emissions.

Introduction

The aviation leasing industry is increasingly scrutinized for its environmental impact, with Scope 3 emissions representing the largest share of lessors' carbon footprints. While significant attention is given to operational emissions, this study explores emissions linked to the transportation of technical components, focusing on a single V2500 engine. This research contributes to the understanding of lifecycle emissions and provides actionable insights for lessors aiming to meet sustainability targets.

Scope and Objectives

This case study aimed to:
- Quantify the Scope 3 emissions generated during the transportation of a V2500 engine over a 20-year lifecycle.
- Identify the specific emissions contributions of various transport modes (land and sea).
- Provide a framework for reducing emissions and aligning with sustainability goals.

Methodology

The study utilized the following methodology:

- Data Collection: The Engine On-Off Log from the technical records pack was analyzed to track the engine's movements during its lifecycle.
- Emissions Calculation: DEFRA guidelines were used to calculate CO2e emissions based on engine weight (including cradle) and distances traveled by land and sea.
- Impact Analysis: Results were contextualized using carbon offset metrics, equating emissions to the number of trees required for absorption.

Key Findings

Emissions Quantification:
- The transportation of the V2500 engine produced 1,854 kilograms of CO2e over 20 years.
- Emissions were generated through routine movements for maintenance, overhauls, and inspections.

Offset Perspective:
- To offset these emissions, 75 trees would need to absorb CO2 continuously for an entire year.
- This metric highlights the tangible environmental cost of transportation in the aviation leasing lifecycle.

Industry Implications:
- With over 20,000 commercial aircraft globally, most equipped with two engines, the cumulative emissions from engine

transportation are significant.
- Addressing these emissions is essential for achieving net-zero commitments and regulatory compliance.

Discussion

The study reveals that transportation emissions represent a hidden but substantial component of an aircraft's lifecycle carbon footprint. For lessors, these emissions provide an opportunity for sustainability leadership. Optimizing logistics through measures such as modal shifts, improved route planning, and carbon-neutral transportation options can significantly reduce this impact.

Furthermore, Oak Tree ESG's research highlights the importance of a lifecycle approach to emissions management. Beyond transportation, other technical events, such as engine overhauls, maintenance visits, and material movements at the end of lease, contribute to Scope 3 emissions. This broader understanding enables lessors to implement more holistic and effective sustainability strategies.

Conclusion

This case study emphasizes the environmental impact of engine transportation in aviation leasing and the importance of addressing Scope 3 emissions. The findings illustrate that even seemingly routine logistical activities carry significant carbon costs. By leveraging data-driven insights and DEFRA-compliant methodologies, Oak Tree ESG empowers lessors to take meaningful steps toward reducing their carbon footprint.

The scale of the challenge - exemplified by the need for 75 trees to offset the emissions from one engine - calls for immediate action. With over 20,000 commercial aircraft in operation, the potential for industry-wide impact is vast. Oak Tree ESG invites aviation lessors to collaborate on innovative solutions that drive both environmental and operational excellence.

References

- DEFRA (Department for Environment, Food, and Rural Affairs) Guidelines.
- Oak Tree ESG internal data and research.