

Thesis Portfolio

Measuring Ablation Rates of CMCs and EBCs from Exposure to High-Speed Water Vapor

(Technical Report)

How Consumer Groups Promote Sustainability in the Airline Industry:

A Case Study on Biofuel

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Department of Mechanical and Aerospace Engineering

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Sociotechnical Synthesis

It's important for any good engineer to constantly ask themselves why the work they're doing is important, and to keep in mind the larger socioeconomic trends that have created the demand for their skills. The technical component of this thesis project was done with support from an aerospace company, as well as the university. UVA's motive for providing funding is straightforward: supporting innovative research labs promotes industry connections, which in turn attracts future researchers and enhances the university's standing in that field. The appeal for the sponsoring company, though it may seem simple, is much more nuanced. One can easily draw the link between our research, which studies high-temperature materials and could possibly lead to jet engine efficiency increases, to an airline's desire to use less fuel and cut costs, but there's more to the story. Over the last fifty years, the airline industry has grown less and less dependent on fossil fuels and has consistently funded research efforts to reduce carbon emissions, beyond what would be done if they were motivated solely by financial self-interest.

The STS research portion of this thesis was done to develop a comprehensive understanding of historical changes in the airline industry, and to determine what forces are most responsible for the current state of the industry. Additionally, different eco-friendly alternatives to fossil fuels were examined to find out what it takes to successfully implement a sustainable solution on a large scale, or, more commonly, why many of the new technologies aren't quite as green as they seem.