

CONSTRUCTION ENGINEERING MASTERS DISSERTATION ABSTRACT

The Journey to NET ZERO - the Case of Airports

The human race is faced with one of the greatest challenges of its history: tackling the Climate Change emergency and drastically reducing its impact on the planet in order to preserve its existence as we know it. Among the activities that alter the composition of the global atmosphere the transportation sector is currently responsible for 24% of direct CO₂ emissions from fuel combustion and aviation contributes with an approximate 2.0% share, but this figure is destined to increase by over an order of magnitude by 2050 if no major actions are taken. Over the past decade the international organizations which regulate the aviation industry have reacted to this call for action with directions and schemes to steer technological improvements and provide global market-based measures for CO₂ emissions reduction, and airports, through their International Council (ACI), have contributed by conceiving a global standard for carbon management (the Airport Carbon Accreditation, ACA, Programme) and by committing to the Net Zero target by 2050.

This research examines what strategies airports are implementing to minimize their absolute emissions as well as those generated by the connected stakeholders that operate within the airport boundaries (airlines, ground handlers, municipalities, etc.), what results have been achieved so far and what future developments can be envisaged.

A literature review has been conducted in order to appreciate the international context, in terms of current policies, available protocols and main innovation trends, and to collect published experiences in airport carbon management initiatives. An analysis of the ACI annual reports has then helped to assess the overall market progress on the carbon agenda, facilitating the selection of airports to be investigated through publicly available data and approached for direct consultation: thirteen sustainability experts, as well as an ACI representative from the Environment and Intermodality Department, have finally accepted to be engaged in semi-structured interviews, which have focussed on the industry's challenges, achievements and foreseen strategies to reduce CO₂ emissions.

The study of the reports has revealed that the number of airports engaging with GHG emissions management through the registration on the ACA Programme has constantly grown since its launch in 2009, even through the COVID19 Pandemic, with Europe leading the way, but with the other regions accelerating over the past 5 years. Nowadays, over 330 airports worldwide are accredited at various levels, accounting for approximately 45% of global passenger traffic, with over a third working with their connected stakeholders to reduce their emissions. The interviews demonstrated general consistency across the identified airports in utilising the ACA guidelines and in adopting similar strategies to reduce direct emissions from the owned or controlled sources (Scope 1), those deriving from the generation of purchased energy (Scope 2) and the indirect ones occurring in the value chain, both upstream and downstream (Scope 3).

The results show that, while Scope 1 and 2 emissions have been considerably reduced in the space of a few years since the airports adherence to the programme, Scope 3 emissions, remarkably higher in proportion, have generally increased in the same timeframe up to 2019 and represent the biggest challenge for the industry, being primarily

related to aircraft emissions and with the number of flights projected to recover and grow after the Pandemic. Notwithstanding the limits of the research, the conclusion is that whilst the airports Net Zero target is technically achievable by 2050, and could be fulfilled even earlier, the complete de-carbonization of the aviation industry is significantly more complex and will have to invoke a combination of multiple strategies, including radical technological improvements, the adoption of sustainable fuels and positive economic measures.

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December 2021