



## Definition of an Ecolabel for Aircraft

Task for a *Master thesis* according to university regulations

### Background

It can be observed that new passenger aircraft are advertised with many claims about their environmental advantages compared to a reference model and compared to the competition. These advertisement claims are often not verifiable, not based on any reporting standards (due to a lack of such standards), and generally not backed up by reviewed scientific publications. Published PR information does not help the traveling public. The goal should be to inform the travelling passengers in a way that they can choose a service (an airline with a specific transport option and seating arrangement) and a product (an aircraft type) such that this selection is the least damaging to the environment. An "Ecolabel for Aircraft" should be defined to allow passengers to make this educated choice. A meaningful ecolabel should quantify energy consumption and pollution by way of index scores or units of measurement.

### Task

The task of this thesis is to define an Ecolabel for Aircraft in accordance with ISO 14025 (2006): Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures. A Type III environmental declaration can be described as "quantified environmental data for a product [or service] with pre-set categories of parameters based on the ISO 14040 (2006) series of standards [Environmental management – Life cycle assessment]." The Ecolabel for Aircraft can only be a simplified version of a full life cycle assessment, but should include the categories resource depletion, climate impact, local air quality, and noise pollution. It should be considered that some emission products ( $\text{CO}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{SO}_x$ ) are linked to the fuel and hence their emission mass is solely dependent on fuel usage while others ( $\text{NO}_x$ ,  $\text{CO}$ ,  $\text{HC}$ , Smoke) are also dependent on the combustion process of the engine. All categories should be rated on a scale from A to G. Initially an aircraft related rating should be calculated based on the standard cabin layout and its number of seats. If the airline uses a different cabin layout with a different number of seats, the overall rating changes. For each travel class – First Class (FC), Business Class (BC) and Economy Class (EC) – a separate weighting factor should be calculated based on the cabin floor area (seat pitch times seat width) occupied by the respective seat. All input data for the calculations should be taken from open sources on the Internet and from known aircraft parameters.

The detailed tasks are:

- Discuss the ISO standards for environmental labeling and how they are applied to the "Ecolabel for Aircraft".
- Perform a literature study about existing labeling schemes and evaluate them.
- Define a method to calculate the environmental impact for each category (resource depletion, climate impact, ...).
- Develop a tool that calculates all parameters of the "Ecolabel for Aircraft" and automatically generates the label itself as designed with the most important parameters embedded. Develop a tool for the travelling public to adapt existing labels to a certain seat layout of a certain aircraft operated by a certain airline.
- Calculate ecolabels for some selected aircraft and discuss the results.
- Discuss the overall benefits of the defined "Ecolabel for Aircraft" and propose work on issues that are still open or would warrant improvement.

The report has to be written in English based on German or international standards on report writing.