

# Design of a Hydrogen Near Zero Emissions Passenger Aircraft

Task for a Bachelor Project

## Background

The European Parliament and the European Commission set the goal for the EU to become climate neutral by 2050. This is also true for the civil aviation industry. The *Refuel EU* aviation legislation is one element to ensure this. A passenger aircraft powered by liquid hydrogen (LH<sub>2</sub>) is one possibility. The next passenger aircraft to be built will probably be the replacement of the successful Airbus A320. For environmental reasons, it could be an aircraft flying on hydrogen. The environmental evaluation of passenger aircraft can be done with an equation calculating equivalent CO<sub>2</sub> mass. Flying low(er) is reducing Aviation Induced Cloudiness (AIC) and its equivalent CO<sub>2</sub> drastically. Turboprop aircraft fly slower and as such lower. An LH<sub>2</sub> turboprop aircraft could be a good candidate for a new generation A320.

## Task

This project should discuss proposals to achieve climate neutrality in aviation. The role of hydrogen as an energy carrier in civil aviation and how close it can get towards the environmental goals. The following subtasks must be considered:

- Review of recent corporate and governmental goals in terms of sustainability and climate change.
- Review data of the Airbus A320. List the Top Level Aircraft Requirements (TLAR).
- Recalculate the A320NEO as reference aircraft.
- Calculate an A320NEO powered by LH<sub>2</sub>, a kerosene powered turboprop, and a LH<sub>2</sub> turboprop with given spreadsheets.
- Calculate the overall environmental impact in equivalent CO<sub>2</sub> mass. Consider non-CO<sub>2</sub> emissions.
- Optimize the designs for minimum equivalent CO<sub>2</sub> mass. Extend an existing spreadsheet (SAS) for this purpose.

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