



Zero Emission Aviation

A statement from aviation research organizations
from 13 different countries – the ZEMA Group



Introduction

As an issue of global concern, sustainability has become more important than ever, affecting lives from the smallest village to the largest metropolis. The aviation sector needs to play its role in this challenge, in this transformation of how we live. After decades of growth in air traffic across the globe, we strongly believe that a transformation of the aviation system itself is now dawning. We, the ZEMA Group, seek to shape this transformation in line with societies' needs and in close collaboration with all stakeholders of the aviation ecosystem with the aim of achieving **zero emission aviation**.

Zero emission aviation (ZEMA)

Aviation research organizations from 13 different countries will actively support the goal of sustainable aviation. In fact, we intend to go one step further – we want to achieve zero emission aviation (ZEMA).

An international challenge – an international industry – an international response

International commitments to achieve global net zero emissions by the second half of the 21st century are set out in the UN Paris Agreement. The UN Sustainable Development Goals encourage environmentally responsible growth worldwide.

International aviation can foster the achievement of these goals since aviation plays a vital role as a driver of economic growth. It can help balance the growing need for mobility with a minimization of its negative impacts.

In Europe, for example, the drive to reduce emissions has been confirmed by the European Commission's Green Deal, which aims at achieving climate neutrality by 2050. For the aviation industry, the European Commission's vision, Flightpath 2050, sets specific goals, building on previous work by the Advisory Council for Aviation Research and Innovation in Europe (ACARE). In the light of this, the Chief Technology Officers (CTOs) of seven of the world's major aviation manufacturers declared the following at the Paris Airshow 2019:

"Aviation connects our world by efficiently and rapidly moving people, opening new economic opportunities and transporting food and goods all over our planet. Aviation promotes global understanding, generating rich cultural exchanges and thereby contributing to peaceful coexistence."

We, as the ZEMA Group, make the following statement:

As researchers, we aim for an aviation system which is free of negative impacts. We will do our utmost to protect our planet and communicate this to the public in order to achieve not only acceptance but strong support for aviation.

For future generations of aviation products, the overall goal is to achieve the least possible impact of aviation. That means close to zero emission aviation for the entire product life cycle. In the long run, a single parameter target, such as being CO₂ neutral, is insufficient and misleading. We must view the transformation as a holistic challenge.

In particular, we will address the following topics:

- As researchers, we fully support the industry's targets described above by the CTOs and will even go one step further. Designing aircraft and engines by improving efficiency and reducing emissions from combustion processes and noise is the first step. Our long-term vision follows a more ambitious roadmap. We will start with the evolutionary technologies available today to enable rapid development and implementation. This first step, however, is simply a springboard to the radical technologies of tomorrow and the achievement of our final goal, **zero emission aviation**.

- *Sustainable aviation fuels* will play an important role. As burning any kind of fuel is a combustion process which leads to emissions, we are committed to working on the development of alternative energy sources for propulsion.

- *Climate-optimized routing* will be a key element to minimize the impact of aviation on the atmosphere. We will provide the necessary tools and data to define the appropriate time- and location-dependent trajectories as well as the requirements for aircraft to be capable of flying these trajectories efficiently.

- We will address the topics of *urban air mobility* and *electric flight* because we believe that these new aviation elements will provide additional technological advancement and open up new dimensions of sustainable mobility.

- Our focus will not only be on each vehicle's mission, but the vehicle's entire life cycle, from design and manufacturing to operation and maintenance. The ZEMA Group's target is to achieve minimum impact throughout the product life cycle.

Conclusion

The recent coronavirus outbreak had a massively negative effect on the aviation industry to an extent which has never been seen before. As the economy and industry are recovering, we must not lose sight of our zero emission goal but seize the opportunity to create a more sustainable aviation ecosystem.

We are committed to achieving this in the interest of all societies and the people impacted by the aviation industry as a whole. The future research of our ZEMA Group will enable us all to reach the goals of **zero emission aviation**, improving lives from the smallest village to the largest metropolis.

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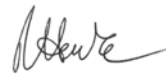
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