Contribution of the EASN Association to the discussions for FP10

Clean Aviation and SESAR 3 disruptive technologies, drawing on the expertise from the Clean Sky and SESAR programs and Horizon Europe, have already made notable efforts in reducing net greenhouse gas (GHG) emissions from commercial air travel. In parallel, several collaborative research projects funded in the frame of the Aviation Programme of Horizon Europe and at national level, have contributed with emerging innovation towards decarbonizing the sector. These advancements are expected to have a significant medium-term impact and result in substantial emission reductions by 2030 and beyond.

The expected appreciable decarbonization of the sector represents a significant element in achieving the ultimate goal of a sustainable, climate neutral and circular aviation by 2050[1]. Yet, achieving this goal requires a dedicated and sufficiently funded aviation program in the frame of FP10, addressing additional considerations, including economic competitiveness, social impact, and circular economy principles, all while ensuring that safety requirements and performance aspects are not compromised. These elements are crucial for a comprehensive approach to sustainability and need to be considered:

- **Environmental Impact:** Addressing also non-GHG emissions like nitrogen oxides and particulate matter, along with contrails, is crucial for a sustainable aviation. Strategies should involve advancing propulsion technologies and exploring alternative fuels to minimize these impacts, ensuring a comprehensive approach to environmental sustainability.
- **Economic Competitiveness:** Sustainable aviation technologies must be financially viable and competitive in the market. This involves reducing costs and improving efficiency without compromising environmental goals. By implementing cost-effective innovations, the sector can ensure broader adoption and integration of green technologies.
- **Social Impact:** Technological advancements in aviation should benefit communities, workers, and passengers. It is essential to ensure equitable distribution of benefits and provide support for the workforce during technology transitions. This includes training programs, job creation, and maintaining high standards of passenger/customer experience.
- **Circular Economy:** Adopting circular economy principles is vital for minimizing waste and promoting the reuse and recycling of materials, including critical raw materials, throughout the aircraft lifecycle. This approach not only reduces environmental impact but also enhances resource efficiency and long-term sustainability.

The challenge lies in balancing these diverse factors, to ensure that the aviation sector meets its environmental targets while remaining economically viable, socially responsible, and circular.

To face this challenge, a research framework is needed to allow for the further maturation and demonstration of technologies that are currently in the exploration stage and will be proven appropriate for implementation. In parallel, it is crucial to boost research on elements that are underrepresented or missing in the current Horizon Europe framework but are mandatory for achieving the target of a sustainable and circular aviation.

1. *European Commission, Directorate-General for Research and Innovation, Fly the Green Deal – Europe's vision for sustainable aviation, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2777/732726*

Examples of such significant open questions are: a) the full understanding of the influence as well as the development of technologies to handle non-GHG emissions, contrails, etc., b) the appropriate consideration of circularity aspects and their integration in the aircraft design phase, accounting also for the challenge of the non-recyclability of today's principal structural materials of modern aircrafts, c) the advancement from current state-of-the-art eco-design to design for sustainability including the need for the establishment of reliable methods and tools for measuring sustainability, d) the advancement of sustainable maintenance, repair & overhaul (MRO) technologies, e) the advancement and exploitation of sustainable aviation fuels (SAFs), f) the exploitation of Artificial Intelligence (AI) and machine Learning (ML) technologies, to mention only some.

EASN recognizes that the challenges are big, and the time is short. Therefore, also the next Framework Programme should be Impact-driven. Yet, a shift is needed in the interpretation of 'IMPACT', which is currently related explicitly to technologies and innovations expected to be implemented in the short and medium term. It must be recognized that low TRL breakthrough and disruptive innovations might be even more impactful in the longer term when addressing technological challenges for which there are not even concepts on how to handle them but are mandatory for achieving the common European goals we set. The above shift will enable not only to feed the innovation pipeline, which is an indispensable prerequisite for meeting the challenging achievements expected from the sector by 2050, but will also essentially contribute to ensure excellence in aeronautics education and highly skilled European human power.

To this end, the full exploitation of the academic aviation research ecosystem in Europe is indispensable. The European Aeronautics Science Network (EASN) is eager to contribute to a fruitful dialogue with the European Commission and all aviation stakeholders to shape the most suitable framework and targets for the Next Framework Programme (FP10).