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## The Dangerous Decline of Upstream Aeronautics Research in Horizon Europe

The environmental goals set out in the Green Deal of the European Commission require disruptive emission changes in the transport sector, for the aviation sector the set goals are particularly challenging. For achieving them within the 2050 timeframe it is paramount to enforce both exploratory research for innovation as well as validation and demonstration towards competitive innovative products. For a number of key technologies, a significant gap currently persists between state of the art and the characteristics required for their safe and efficient market introduction. It needs to be underlined that development cycles in aviation typically can take more than 20 years between first concepts and market introduction, making a focused and accelerated approach on technology research key to deliver on the expected systems change before 2050.

There seems to be a kind of contradiction between the emphasis officially put on very innovative, disruptive solutions, and the decrease of funding for preparing them at the right TRL level – by definition, many technologies needed for such solutions are still at a low level of maturity.

Aeronautics research in Horizon Europe today has two dedicated main sources of funding: one is related to the Work Programme of the Clean Aviation Joint Undertaking (CAJU) Strategic Research and Innovation Agenda (SRIA) aiming at technology integration and demonstration, the second is a limited number of aviation-relevant calls in the Cluster 5 Work Programme, however, marginal in volume compared to CAJU funding. About 90% of the available resources for aviation are exclusively foreseen for integration and demonstration actions.

It is worth noticing that while the CleanSky2 JU (CS2) in Horizon 2020 had a limited, but dedicated area reserved for upstream research. This is no longer the case for CAJU. In the course of the preparation of the CAJU SRIA a collection of highly relevant topics aiming at exploration and maturation of disruptive technologies at low technology readiness level (TRL) had been established in an “Explore & Mature” pillar presented to the European policy makers via the “Ambitious Vision” document<sup>1</sup>, but was removed from the core of the SRIA and shifted to the annex with a reminder that it shall be picked up by the Cluster 5 Work Programme<sup>2</sup>. This adoption did not take place, leaving the majority of low TRL research topics unconsidered in the Horizon Europe framework, while being important for the disruptive changes requested from the aviation sector.

The number of calls and the resulting projects in the frame of CAJU will be by almost an order of magnitude less compared to the number of projects in its predecessor CS2, the same holds true for the Cluster 5 Work Programme. As a result of the described conditions, the opportunities for aeronautics-related disruptive research have been dramatically diminished. As the ERC Programme (Pillar 1) and national research funding of some Member States cannot compensate this negative development, the until now successful European research cooperation in these needed technology areas is seriously in danger by this development, unless appropriate measures are taken now as:

- a dedicated area reserved for upstream and break-through research in CAJU, similar to CS2;
- sufficient priorities for aviation research at low TRL on disruptive technologies in the Cluster 5 Work Programme with the needed resources.

<sup>1</sup> „An Ambitious Vision for Clean Aviation“, January 2020

<sup>2</sup> “Strategic Research and Innovation Agenda”, Draft July 2020

The very limited funds until now available to low TRL upstream research, together with the decision to disregard the Explore & Mature pillar, will endanger not only the ambitious targets of the CAJU but moreover the entire ecosystem of academic research in the European Union, which was mainly built on collaborative research initiatives with a broad participation throughout Europe, not limited only to partners from Member States with major aerospace industry. This also holds for research topics not directly related to climate targets but which essentially contribute to technologies needed for Europe's competitiveness in aviation.

An adequate consideration of upstream research topics and a broad participation of universities in CAJU and Collaborative Research is vital for the European Union to achieve the targets set in the Green Deal and to have a pipeline of fresh ideas for future innovation and worldwide competitiveness. It is therefore indispensable that appropriate actions are introduced to overcome this detrimental situation.

The success of Europe's Green Deal for aviation depends significantly on the entire technology supply chain, in which the academic research community plays an important role not only by educating the next generation of engineers and researchers but also as incubator of novel and disruptive technologies. Their role has to be ensured within Horizon Europe.

The European Aeronautics Science Network and its independent Stakeholders Advisory Board (SAB) warns about this threatening development and recommend taking urgently the proposed measures for enhancing upstream aviation research within Horizon Europe.



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