EU-CHINA AVIATION FLAGSHIP INITIATIVE IN HORIZON 2020



FOR GREEN, SAFE AND INCREASED DIGITALISATION OF AVIATION IN THE EU AND CHINA

Green, safe and increased digitalisation of aviation
International cooperation in aeronautics with China
Aviation operations impact on climate change

EU-CHINA AVIATION FLAGSHIP INITIATIVE IN HORIZON 2020

Aviation and especially aeronautics constitute an important strategic area of collaboration on research and innovation between the EU and China. Apart from collaborations at bilateral level by European aviation industries with their Chinese partners, aviation research collaboration at the EU level dates back over ten years ago.

The European Commission's DG Research and Innovation (DG RTD) and the Chinese Ministry of Industry and Information Technology (MIIT) have a long-standing cooperation on R&D in the field of aeronautics/aviation through jointly co-funded coordination and support actions as well as research cooperation projects. The EU-China 2020 Strategic Agenda for Cooperation, endorsed by the EU-China Summit in November 2013 in Beijing supported cooperation in aviation, i.e. safety, impact to the atmosphere and cooperation in research and innovation in aviation. Building on the outcome of the FP7 Coordination and Support Action GRAIN, priorities of common interest were identified in consultation with EU and Chinese industry and included into Horizon 2020 Framework Programme.

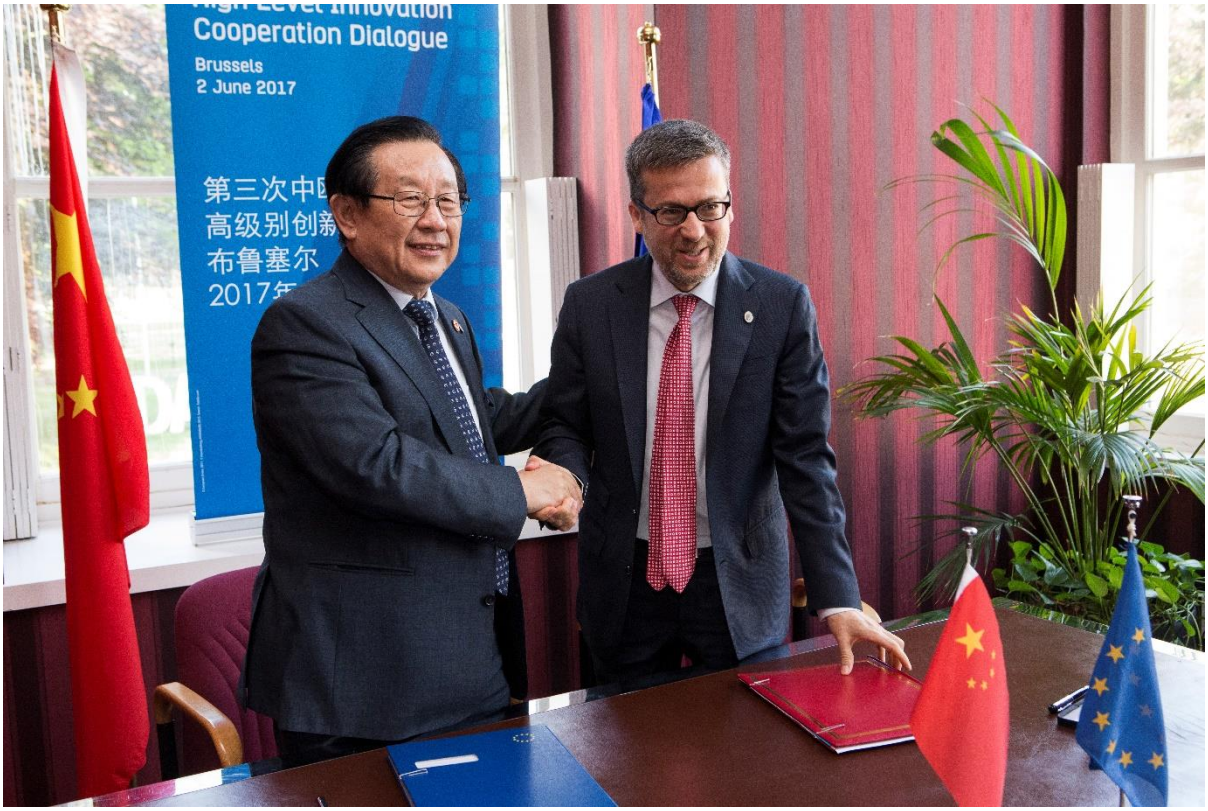
The EU-China flagship initiative on aviation in Horizon 2020 was deployed in three phases for each of the three Work Programmes published in the course of the duration of Horizon 2020. Four research and innovation projects were selected under the topic on “International cooperation in aeronautics with China” included into 2014-2015 Work Programme. A dedicated Coordination and Support Action was launched under 2016-2017 Work Programme to identify gaps, barriers and needs in the aviation research, bringing forwards a set of recommended topics for future cooperation in aviation between EU and China. The last Work programme 2018-2020 promoted EU-China cooperation on "Aviation operations impact on climate change" with specific attention to 1) mitigation strategies towards greener flight trajectories, and 2) mitigation strategies based on changes in the use of alternative fuels.

EU-CHINA CO-FUNDING MECHANISM (CFM) IN HORIZON 2020

In 2014, the Horizon 2020 programme ceased to fund automatically Chinese applicants. Co-Funding Mechanisms (CFM) were needed, eventually set by Chinese authorities to support the joint research activities carried between the EU and China. The China CFM on research and innovation cooperation has played a significant role in supporting the cooperation in topics of mutual interest since its launch in December 2015.

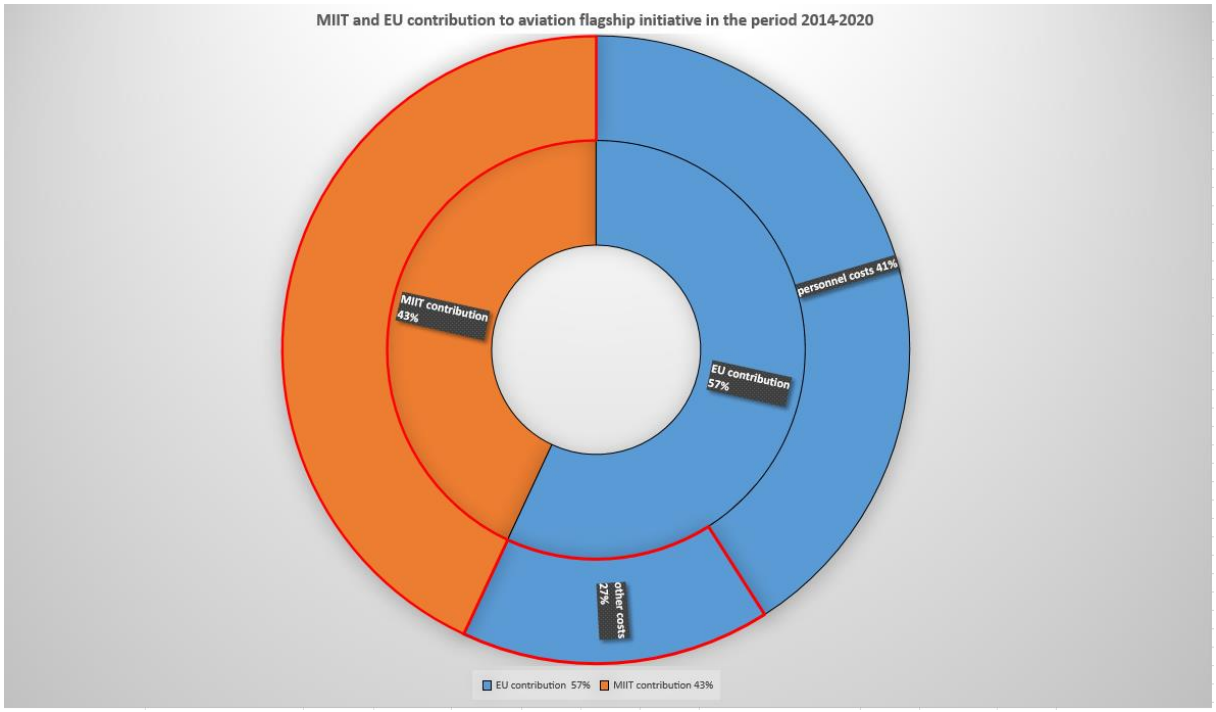
The CFMs involved two Chinese Ministries: MOST (and its China Science and Technology Exchange Centre – CSTEC) and the Ministry of Industry and Information Technology (MIIT), as well as one Chinese funding agency, the National Natural Science Foundation of China (NSFC). MOST, MIIT and NSFC co-funded five different flagship initiatives: food, agriculture and biotechnologies; environment and sustainable urbanisation; surface transport, aviation, biotechnologies for health and the environment.

In addition to the flagship initiatives, MOST covered also the participation of Chinese entities in nine additional priority areas, for an overall (flagship and priority areas) commitment of 200M¥ on an annual basis to provide competitive funding to China-based entities participating in joint projects with European partners under Horizon 2020 calls from 2014-15 and 2016-17 Work Programmes. During the third Innovation Cooperation Dialogue (ICD) meeting, held in June 2017, the CFM was renewed for the period 2018-2020 with the same budget commitment from both sides.

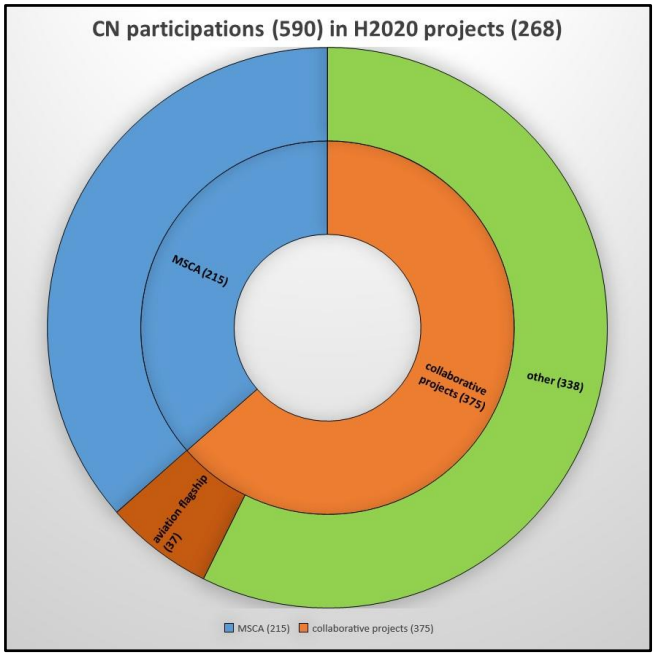


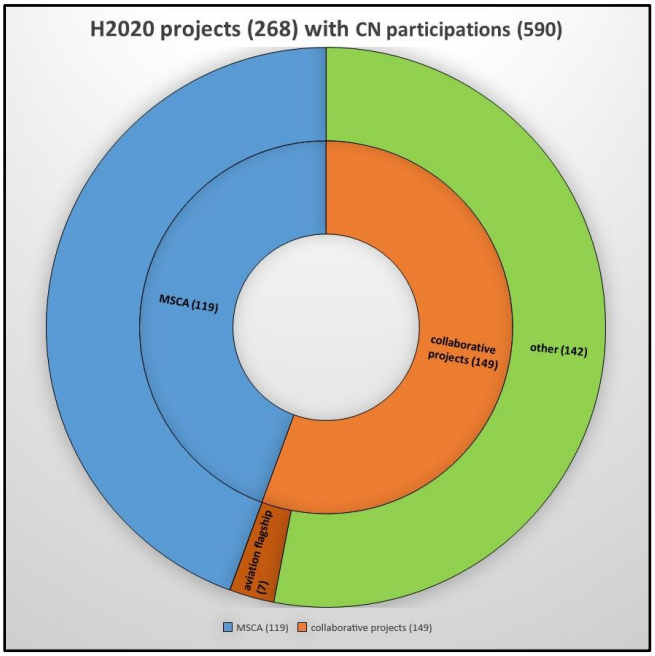
EU-CHINA AVIATION FLAGSHIP IN H2020 WITH THE CFM

The CFM set by MIIT has supported the flagship initiative on Aviation, for which the two sides (EC and MIIT) secured an overall investment of more than € 25M altogether under Horizon 2020 (from 2014 to 2020), covering 7 projects, all being co-funded by MIIT, with a balanced efforts from both sides in terms of funding. It is also worth noting that personnel costs are not eligible in MIIT grants, while Horizon 2020 grants can cover personnel costs up to 60% of the EU project contribution. Considering that personnel costs generate also an overhead of 25%, the Chinese financial contribution to aviation projects overcomes therefore the EU contribution in contractual items other than personnel costs.



The EU-China aviation flagship represents a significant portion of H2020 collaborative projects with Chinese participants (37), accounting for more than 10% of all H2020 Chinese entities participations in collaborative projects.





EU-CHINA AVIATION FLAGSHIP IN H2020 WP 2014-2015

Under the first Work Programme of Horizon 2020, four research and innovation actions started in April 2016 with joint funds from the EU (DG Research and Innovation) and China (Ministry of Industry and Information Technologies MIIT) to address the technology areas of mutual interest focusing on green, safe and increased digitalisation of aviation. The projects addressed specific domains identified within the GRAIN Coordination and Support Action, where technical expert groups identified areas and specific topics of mutual interest, four of which after a consultation process with the European and Chinese stakeholders, were selected for the coordinated call "International cooperation in aeronautics with China" under the Horizon 2020 Transport Work Programme 2014-2015.

PROJECTS/TOPICS IN WORK PROGRAMME 2014-2015

ECO-COMPASS
Ecological and multifunctional composites for application in aircraft interior and secondary structures
http://www.eco-compass.eu/

EMUSIC
Efficient manufacturing for aerospace components using additive manufacturing, net shape HIP and investment casting
https://www.birmingham.ac.uk/emusic

DRAGY
Drag reduction in turbulent boundary layer via flow control

http://www.cimne.com/dragy

IMAGE
Innovative methodologies and technologies for reducing aircraft noise generation and emission
http://www.cimne.com/image

EU-CHINA AVIATION FLAGSHIP IN H2020 WP 2016-2017

The experience gained with the Coordination and Support Action GRAIN under FP7 and the subsequent implementation of 4 research projects in the first H2020 Work programme 2014-2015, suggested to follow the same strategy and to promote a new Coordination and Support Action under the Work Programme 2016-2017 of H2020 for Identification of gaps, barriers and needs in the aviation research. Technical expert groups, including representatives of EU industries, identified areas and specific topics of mutual interest to be proposed as potential topics in future Work Programmes. 18 topics were selected for potential future international cooperation in aviation. China contributed to ICARe through the parallel project INNOVATE. To gauge participation interest for entities involved in aviation research from Universities, Research organizations and Industries, more than 80 stakeholders submitted their feedback with interest in participating in at least one topic of those proposed.

PROJECTS/TOPICS IN WORK PROGRAMME 2016-2017

ICARe
Identification of gaps, barriers and needs in the aviation research
https://icare-h2020.eu/

EU-CHINA AVIATION FLAGSHIP IN H2020 WP 2018-2020

Finally, the last Work programme 2018-2020 promoted EU-China cooperation on "Aviation operations impact on climate change" with specific attention to 1) mitigation strategies towards greener flight trajectories, and 2) mitigation strategies based on changes in the use of alternative fuels.

This topic promoted balanced and substantial cooperation between EU and Chinese organisations, and it did not address new aircraft technologies on structures, systems, engines nor their integration, towards minimising the impact in the medium and longer term, covering TRL spectrum from 2 to 4. The projects are expected to formulate specific recommendations for stakeholders on flight planning and on the use of alternative fuels.

This action is part of the larger Aviation International Cooperation Flagship called "Safer and Greener Aviation in a Smaller World" mentioned in the introduction to the work programme 2018-2020, and it is therefore not the outcome of the specific bilateral areas of cooperation in aviation between EU and China identified though previous Coordination and Support Actions.

GREAT
Greener Air Traffic Operations

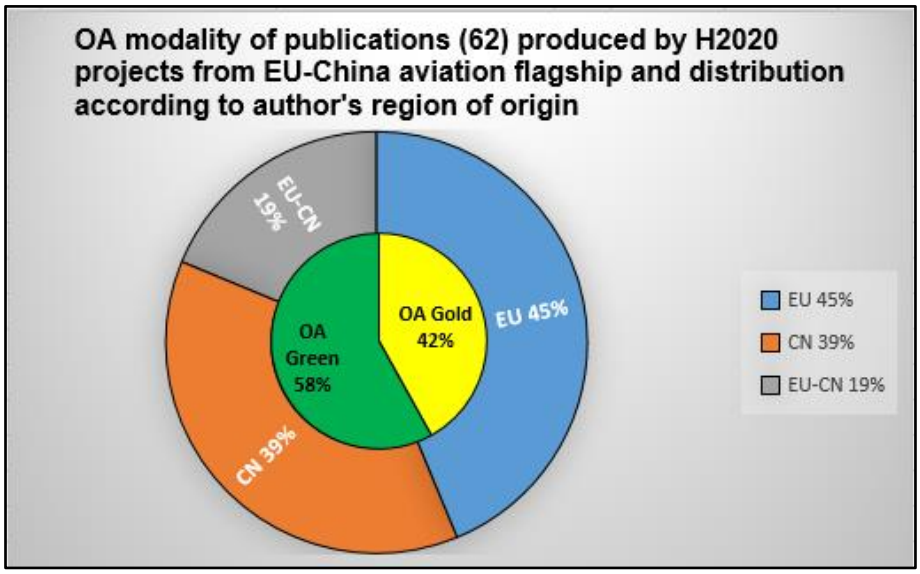
https://www.project-great.eu/

PROJECTS/TOPICS IN WORK PROGRAMME 2018-2020

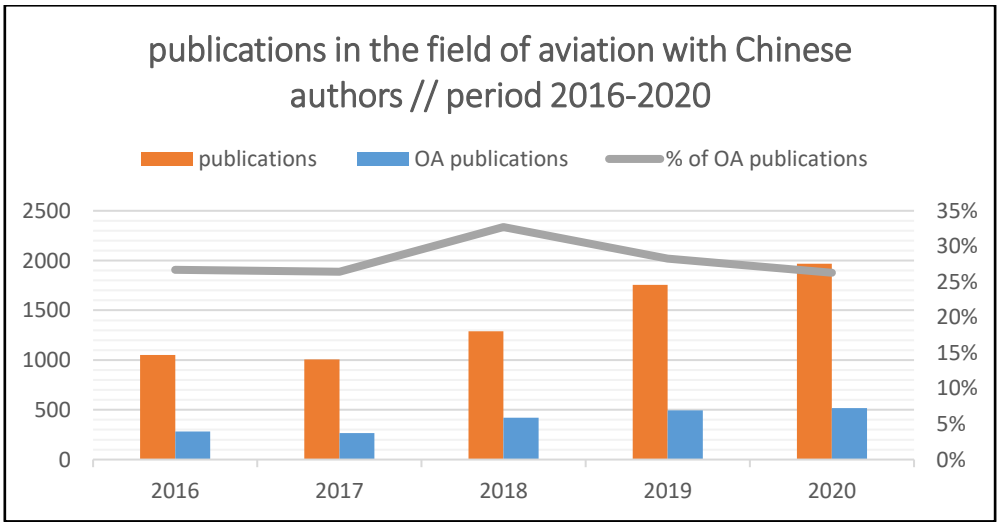
ALTERNATE
Assessment on alternative aviation fuels development
https://www.alternateproject.com

IMPACT OF EU-CHINA AVIATION FLAGSHIP IN H2020

The projects funded by the EU-China aviation flagship initiative under the Work Programme 2014-2015 of Horizon 2020 have produced so far more than 60 publications in peer-reviewed journals. The Coordination and Support Action ICARe from 2017 did not have a strict research content, but rather a policy content and it therefore didn't produce any scientific publication. The projects from 2018-2020 Work Programme are not mature enough to have come forward with significant scientific literature. All the publications from the four projects included in 2015 topic on International cooperation in aeronautics with China were published in open access mode, following the contractual obligations introduced by the Horizon 2020 programme on scientific papers. This allowed a wide dissemination and a high impact.



Given that the projects saw a balanced effort from the two sides, EU and MIIT, in terms of resources provided, the number of publications is quite equally split between EU and China (45% vs 39%), thus resulting in a considerable amount of purely Chinese scientific publications published in Open Access in the specific domains tackled by the projects. In addition, almost 20% of the scientific production had authors from EU and China jointly signed the publications, thus reinforcing the scientific cooperation in the field of aviation. This is particularly significant, as the trend of Chinese authors to publish aviation related papers in Open access has been constant over the last five years (2016-2020), rarely hitting above 30%.



FUTURE PERSPECTIVE OF EU-CHINA FLAGSHIP INITIATIVE ON AVIATION IN HORIZON EUROPE

The longstanding cooperation between EU and China on aviation can be reiterated in the future Horizon Europe framework program. As clearly stated in the EC Communication on the Global Approach to Research and Innovation from 18 May 2021, "reaching a level playing field and reciprocity will be conditional to developing cooperation with China".

The Coordination and Support Action ICARe, launched under H2020 in 2017 had the goal of deliver recommendations about International Cooperation for the Aviation Research and Innovation. In the context of this project, an open dialogue with China was established to support European Commission in the definition on its International cooperation strategy. Together with the Chinese counterpart and its parallel project INNOVATE, experts from both sides China jointly explored and discussed areas and directions of China-EU civil aviation cooperation under the Horizon European Framework Programme. The project put forward a list of 18 topics of mutual interest where EU and China might cooperate in the future and strengthen the cooperation in aviation research.

The primary goal is currently to contribute to global issues, reducing the effects of aviation transportation on climate change and meeting the demand of green low carbon society. Proposed research areas of common interests therefore include low-carbon energy, green aviation materials, lightweight and intelligent structure, airport operation coordination and icing safety assessment.

It is also proposed to set up a China-EU joint research team to conduct basic, frontier and exploratory (i.e. low TRL) joint research, so as to promote joint efforts between China and the EU to address global climate and environmental challenges.