



Association of
European Research Establishments in Aeronautics

Success stories on EU funded Aviation Research and Innovation

Insights compiled by EREA

November 2025



Designing
the Future
of Aviation

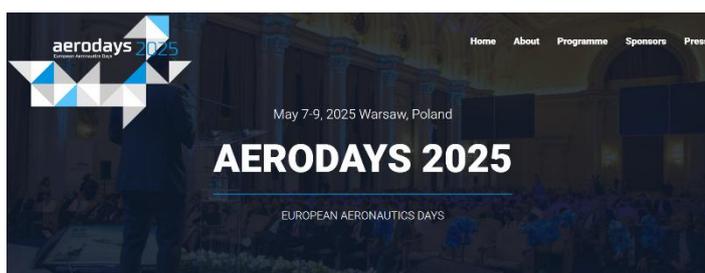
Introduction

For many years, the European Union's (EU's) Framework Programme for Research and Innovation, commonly called the Framework Programmes (FPs), has provided essential funding for research and innovation (R&I) in the aviation and many other sectors. Successive FPs have proved to be the key European instrument for implementing Europe's aviation vision and strategy, facilitating cross-border cooperation, strengthening collaboration across industry, research organisations and universities, and enhancing European competitiveness. It is widely acknowledged that the European-wide cooperation and cross-sectoral collaboration that FPs delivers are more than would ever be possible via national or vertical programmes.

To demonstrate the success of the previous FPs and help lay the foundation for future FPs, the objectives of this brochure are:

- To provide real-life examples to show the impact of FP projects to the development and entry into service of equipment, products and systems across the aviation sector, from complete aircraft through to air traffic control infrastructure.
- To emphasise lessons learnt from the previous FPs to help guide and shape the forthcoming FP10 programme to maximise the tangible return from its contribution to the development of the European aviation sector.

Taking the lead to progress towards these objectives and supported by as many industry participants as the limited preparation time allowed, the Association of European Research Establishments in Aeronautics (EREA) presented several FP aviation success stories at the Aerodays 2025 Conference held in Warsaw in May 2025.



One of the conclusions from the Aerodays 2025 was that continuous communication and outreach is needed to publicise aviation's R&I success stories to policy-makers and the public, particularly in areas of high societal interest, such as the environment, jobs, skills, safety and security.

As the starting point of the continuous process to publicise the success stories, EREA is producing this document to further emphasise the importance of the FPs for European aviation R&I. It is the aim to broaden participation in the publicity process across the aviation sector to include full representation from industry, which makes the largest contribution, universities and others.

Ultimately, the leadership role for this publicity programme should be taken up by the Advisory Council for Aviation Research and Innovation in Europe (ACARE) as the single concerted voice for European aviation R&I.

Aviation's goals

Of course the R&I funding from the FPs must be aligned with and focused on delivering the aviation sector's policy and strategic goals. These goals were originally set out in *Flightpath 2050*¹, which was used as the basis for ACARE's strategic research and innovation agenda (SRIA) to provide the basis for the European aviation's strategic technology roadmap. Driven by a range of factors, including the ever-increasing need to reduce aviation's environmental impact and lessons learnt on resilience from the COVID-19 pandemic, Flightpath 2050 was subsequently updated to *Fly the Green Deal*².

Quoted directly from *Fly the Green Deal*, Europe's aviation high-level goals are:

- By 2050, achieve **climate neutral**³ aviation based on validated and globally accepted tools and models, in the full sustainability context (environmental, economic and societal) in line with United Nations (UN) Sustainable Development Goals (SDGs), integrating the circular economy concept to be an equitable contributor, with other transport modes, to fully climate neutral mobility.
- Ensure the sustainability and other **needs of citizens** not only as travellers and as customers but also as recipients of aviation's external impacts, such as noise and other disturbances. This goal also includes meeting the needs of the education system and skilled workforce.
- Design and apply the necessary **instruments** to maintain the European aviation industry's **global leadership and competitiveness** all along the supply chain, including researchers, manufacturers, infrastructure and aircraft operators, and service providers, by providing the highest quality, cost efficient, innovative products and services and developing and sustaining the required human capital, knowledge and skills.

Fly the Green Deal translates these high-level goals into measurable progress that must be made over the short-, medium- and long-term timeframes to 2030, 2035 and 2050, respectively. *Fly the Green Deal* also sets measurable goals for:

- Aviation's integration into the European mobility system.
- Aircraft and engines.
- Infrastructure, operations and services, including air traffic control and airports.
- Energy and fuel.
- Education, training and research.
- Digital transformation.
- Development, demonstration and deployment, including manufacturing and research facilities.
- Safety, security and resilience.



¹ <https://transport.ec.europa.eu/system/files/2016-09/flightpath2050.pdf>

² <https://op.europa.eu/en/publication-detail/-/publication/69dfdaf4-07d5-11ed-acce-01aa75ed71a1/language-en>

³ As defined in Article 2 of EU REGULATION (EU) 2021/1119 - https://ec.europa.eu/clima/eu-action/european-green-deal/european-climate-law_en

These goals should be used to create a new European aviation technology road map as the basis of the aviation components of the future Framework Programmes both in terms of programme content but also how the programmes are organised and the instruments that are used.

The Framework Programme

The EU's Framework Programme is a series of multi-annual programmes, typically ranging from four to seven years in length and providing funding to support and promote R&I across Europe in line with the EU's strategic priorities. The series started with FP1, running between 1984 and 1987, with the current programme, FP9, called Horizon Europe running from 2021 to 2027. The next in the series, FP10 is due for launch in 2028.

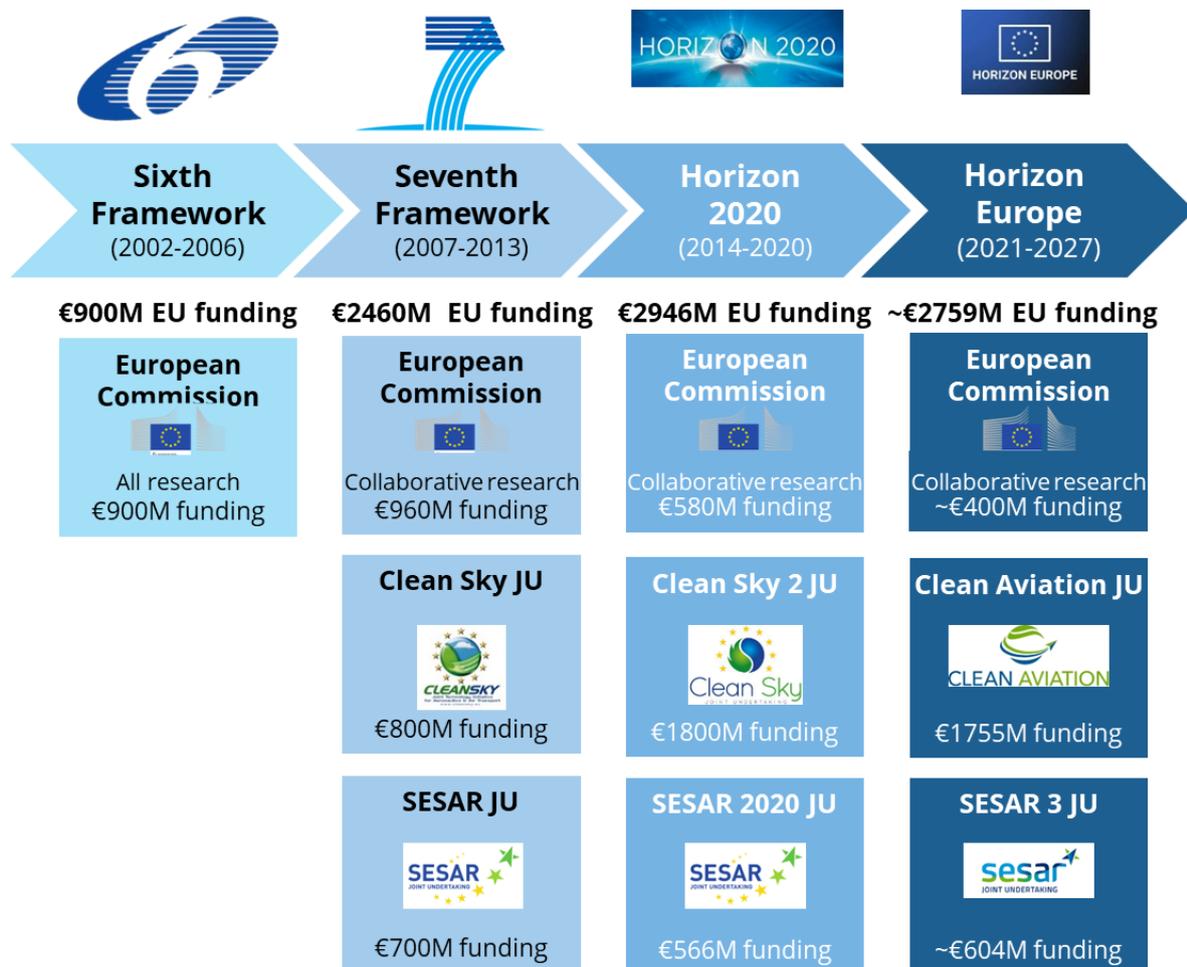


Each FP covers many sectors and is organised as pillars, themes and topics.

The setting of priorities and administration of funding from the Framework Programmes has evolved over time. Before FP7, this was the sole responsibility of the European Commission but in FP7 some responsibilities were transferred to the Clean Sky/Clean Aviation and SESAR Joint undertakings.

<p>The SESAR Joint Undertaking (JU) is a European Union public-private partnership focused on modernising air traffic management (ATM) across Europe in line with the European ATM Master Plan.</p> <ul style="list-style-type: none"> • SESAR 1 (2008–2016). Funded under FP7 (Seventh Framework Programme) and Trans-European Network (TEN-T) funds with matched contributions from industry. • SESAR 2020 (2016–2024). Co-funded by Horizon 2020 with additional contributions from the Connecting Europe Facility (CEF), Eurocontrol and industry partners. • SESAR 3 JU (2021–2031). Established under Horizon Europe with additional contributions from Eurocontrol, industry partners and the CEF. 	<p>The Clean Aviation Joint Undertaking is a European Union public-private partnership for research and innovation in sustainable aviation.</p> <ul style="list-style-type: none"> • Clean Sky 1 (2008–2016). Launched and funded by FP7 with matched contributions by industry and other private partners. • Clean Sky 2 (2014–2024). Launched under Horizon 2020 and matched with contributions by industry and other private partners like research & technology organisations (RTOs). • Clean Aviation JU (2021–2030). Established and funded under Horizon Europe with additional contributions from industry, RTOs, Universities and projects under the European Regional Development Fund (ERDF).

The figure below that shows the level and organisation of funding focused on aviation.



Source: EREA

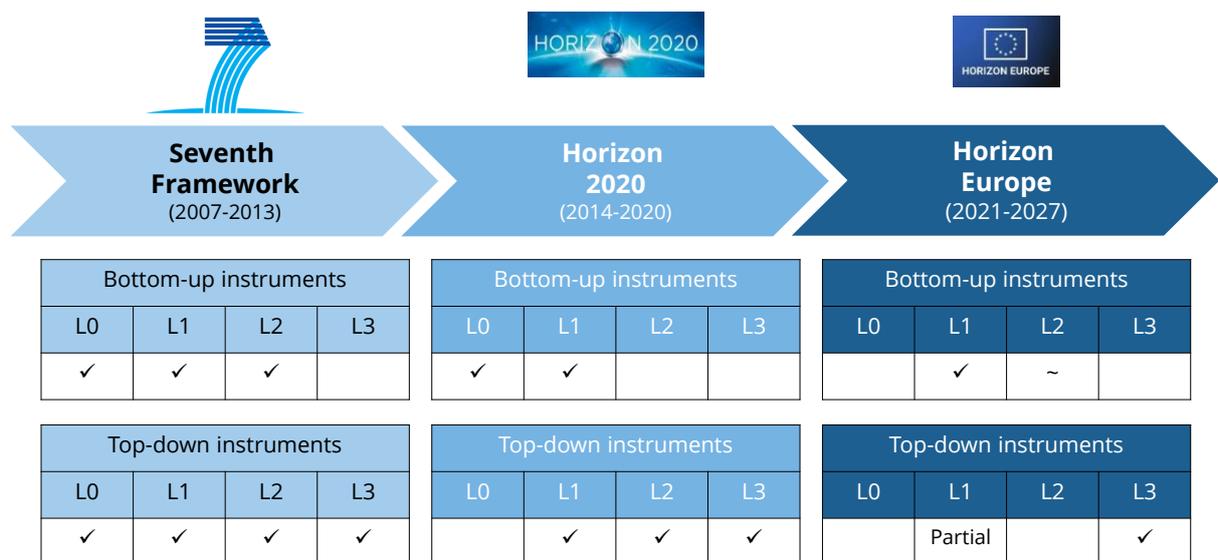
The figure shows that the funding and number of projects peaked in Horizon 2020 (although Horizon Europe is not yet complete and is, therefore, only estimated). One noticeable trend since the creation of the Joint Undertakings is the decline in collaborative research funded by the European Commission – where multiple organisations such as universities, research institutes, industry and public bodies work together, sometimes across different sectors, to meet a common goal. Collaborative research is also funded to a lesser extent by the two Joint Undertakings.

Research is defined classified either as:

- **Top-down**, where the priorities are set by the funding body and calls for proposals (CfP) are prescriptive within specific themes so that applicants must align their proposals with pre-defined objectives.
- **Bottom-up**, where the researchers propose their own research topics and assessed on scientific excellence and innovation potential to encourage creativity, disruptive innovation and long-term research. Funding is provided through various instruments depending on the maturity of the topic or technology as illustrated below.

Instrument	Application	Size
L0	Exploratory blue-sky research , typically bottom-up with a long-time horizon. Focuses on concepts, disruptive ideas and enabling technologies	<~€2M
L1	Specific, targeted research projects (STREP), typically focused on applied research on specific technologies defined bottom up and top down based on ACARE (all stakeholder) SRIAs	~€2M→€8M
L2	Integrated projects (IP), typically focused on large-scale system maturation, integration, testing and validation defined top down according to industrial priorities	~€8M→€50M
L3	Full-scale demonstration , typically at complete aircraft or major system level in an operational environment defined top down according to industrial priorities	~>€50M

The following chart shows the trend in application of the different funding instruments applied bottom-up and top-down from the Seventh Framework Programme through to Horizon Europe.



There is decreasing emphasis on bottom-up research together with a general shift away from L0 exploratory research. Although the focus on L1, L2 and L3 for top-down research supports deployment of existing technologies, this imbalance risks starving aviation’s future innovation pipeline with the associated risks to Europe’s long-term competitiveness. There is also a lack of funding at L2 for bottom-up research creating a fragmented project chain and contributing to the ‘valley of death’ where many R&I projects stall even though they have been successful at L1.

From projects to products

The Framework Programme has undoubtedly contributed to the success of the European aviation sector at least by catalysing multi-disciplinary, cross-border, cross-sectoral, collaborative R&I, enabling universities, research institutes, small and large industry actors and public bodies to work together efficiently and effectively based on each’s strengths. The following pages illustrate how Framework Programme projects have contributed to:

- The Airbus A321XLR, which has more than 550 orders. Since 2002, more than 80 Framework Programme projects have made invaluable contributions to the successful development of the aircraft.
- The Dassault Falcon 10x, which has been supported by more than 35 Framework Programme projects since 2002.
- The Trent EWB, Pearl 700, Pearl 15 & Ultrafan engines to which more than 20 Framework Programme projects have contributed since 2002.
- Cockpit, avionics, flight planning and operational systems.
- Infrastructure including air traffic management and airport systems.

Projects contributing to the Airbus A321 XLR

Design, manufacturing, testing & certification		
FP6 &FP7	Horizon 2020	Horizon Europe
VIVACE MAAXIMUS SARITSU DESIREH HAIC TOICA ARUM IMAC-PRO CRESCENDO	AIPlan4EU UHURA SLOWD FALCON ICE GENESIS MUSIC-HAIC GRAPHENECORE3 INVENTOR SARAH SAFEMODE VIPCOAT DIGICOR A4BLUE QU4LITY SCALABLE NextSim	ALBATROS NEXTAIR

Health monitoring & maintenance	
FP6 &FP7	Horizon Europe
SARITSU AIRBEAM TRIAD PRIMA	NEXTAIR

Structure, aerodynamics & materials		
FP6 &FP7	Horizon 2020	Horizon Europe
SARITSU AFLONEXT ALCAS SCARLETT NACRE ACTUATION2015 CREAM	VIPCOAT DIGICOR A4BLUE QU4LITY OASIS MADELEINE FULLCOMP ALGESMO ITEMB	CENTRELINE



Noise		
FP6 &FP7	Horizon 2020	Horizon Europe
AFLONEXT ERONIMO	TurboNoiseBB DINN INVENTOR ANIMA ARTEM	CENTRELINE

Engines & energy		
FP6 &FP7	Horizon 2020	Horizon Europe
GREENAIR ALFA-BIRD MOET SGO-MAE	IMOTHERP IETSCREEN ALIGHT	HYLENA GOLIAT

Cockpit, avionics, flight planning & cabin		
FP6 &FP7	Horizon 2020	Horizon Europe
SCARLETT ASHLEY ACROSS ALICIA MOET ACTUATION2015	TUPLES ALBATROSS SUMO AAL2 STAIRS 4DTM EAD DECK IMBALS LAPARTS	EQUALITY Sec4AI4Sec ALBATROS

Projects contributing to the Dassault Falcon 10x

Design, manufacturing, testing & certification	
FP6 & FP7	Horizon 2020
TOICA LOCAMACHS HAIC	MISSION TILDA UHURA TSA-1 BEDYN PRODIGE WPC-2 Eco-TECH MEGTESI SWAK U-CROSS GAINS ICE GENESIS MUSIC-HAIC

Cockpit, avionics, flight planning & cabin	
FP6 & FP7	Horizon 2020
ACROSS RESEARCH ARMLIGHT FLIGHTEMA EARTH	OPTIWIND ANGI-HUD DECK NNEQS LITRAS FLIGHT CONTROLS



Structure, aerodynamics & materials	
FP6 & FP7	Horizon 2020
AFLONEXT	TSA-2 TSA-3 TSA-4 DOVER INNOHYBOX T-100-WING NACOR BLADE BINCOLA BALANCE ALFA AEROGUST COMBUSS

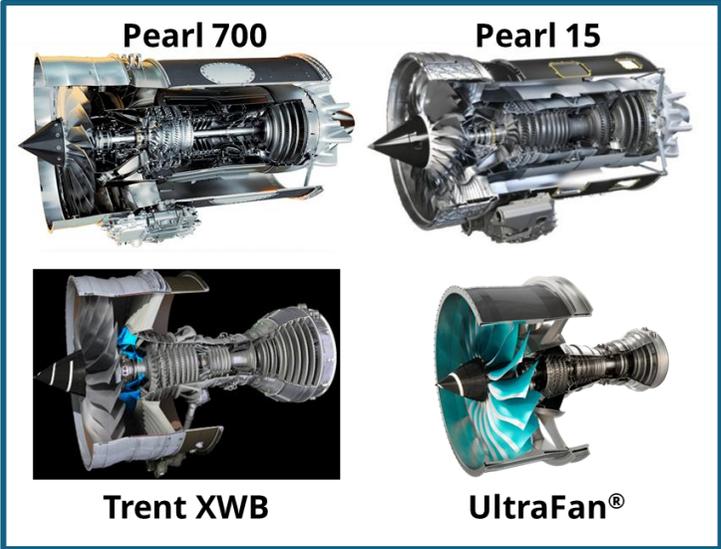
Engines & energy
FP6 & FP7
NIPSE

Noise
Horizon 2020
DJINN INVENTOR ARTEM CANOBLE

Projects contributing to the Trent EWB, Pearl 700, Pearl 15 & Ultrafan engines

Reducing fuel & oil consumption & emissions	
FP6 & FP7	Horizon 2020
ELUBSYS E-BREAK INTELLECT LEMCOTEC ENOVAL VITAL DREAM NEWAC	SENECA

Design, manufacturing, testing & certification	
FP6 & FP7	Horizon 2020
CRESCENDO WEZARD	EMUSIC ENCOMPASS ICE GENESIS MUSIC-HAIC SENECA



Health monitoring & maintenance
FP6 & FP7
E-BREAK STARGATE

SAF
FP6 & FP7
SWAFEA

Noise reduction	
FP6 & FP7	Horizon 2020
OpenAIR ENOVAL VITAL DREAM Cojen	TurboNoiseBB DJINN ARTEM SENECA

Projects contributing to cockpit, avionics, flight planning and operational systems

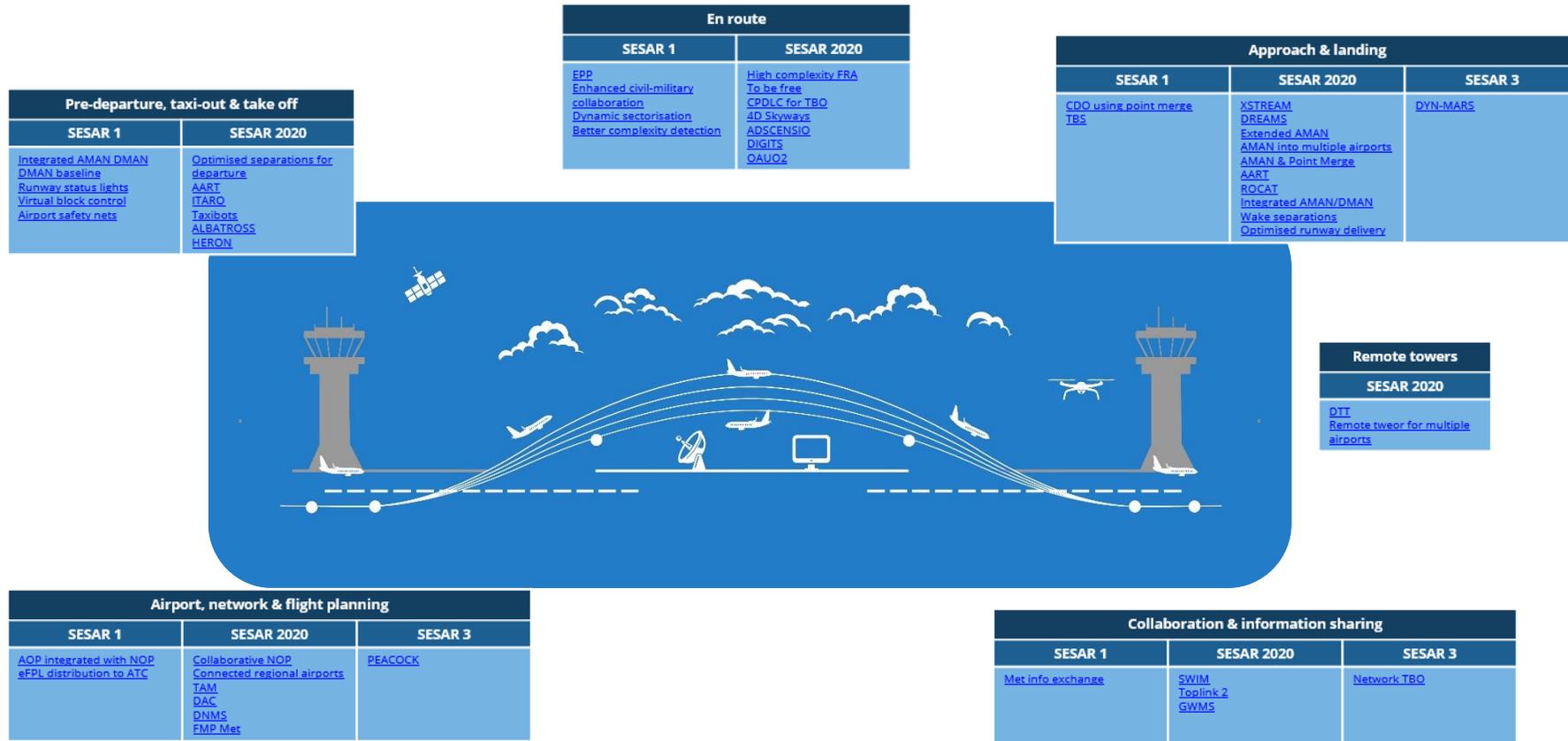
Cockpit		
FP6 & FP7	Horizon 2020	Horizon Europe
ACROSS ALICIA RESEARCH EARTH	TUPLES SUMO AAL2 STAIRS 4DTM EAD DECK IMBALS LAPARTS OPTIWIND ANGI-HUD ARMLIGHT FLIGHTEMA	ALBATROS

Avionics		
FP6 & FP7	Horizon 2020	Horizon Europe
SCARLETT ASHLEY MOET ACTUATION2015	TUPLES ALBATROSS SUMO STAIRS 4DTM EAD DECK IMBALS NNEOS LITRAS FLIGHT CONTROLS	EQUALITY Sec4IA4Sec ALBATROS



Flight planning & operations	
Horizon 2020	Horizon Europe
TUPLES ALBATROSS SUMO AAL2 STAIRS 4DTM EAD IMBALS	ALBATROS

Projects contributing to air traffic management and airports through SESAR



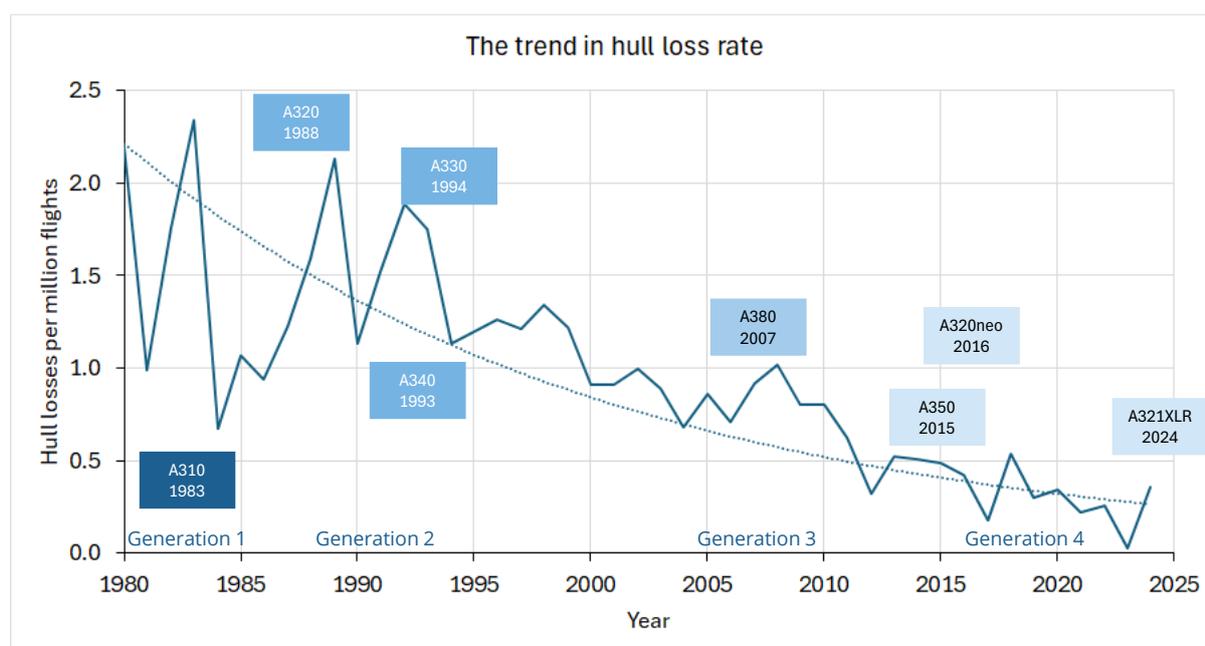
The broader impacts

Although the Framework Programme should not claim all of the broader societal, environmental and economic benefits achieved through aviation's technological advancement, it has undoubtedly made a significant contribution.

Safety

Aviation safety has increased markedly over time as shown in the following figure illustrating hull loss rates per million flight hours from 1980 through to 2024. Over this period the hull loss rate has decreased by approximately 90%. For reference, the chart also shows the approximate entry-into-service dates for the various generations of Airbus aircraft types.

Considering all aircraft, not just Airbus, the hull loss rate⁴ has decreased from approximately 4.2 per million flight hours for Generation 1 aircraft in 1980 to approximately 0.13 per million flight hours for Generation 4 aircraft in 2024.

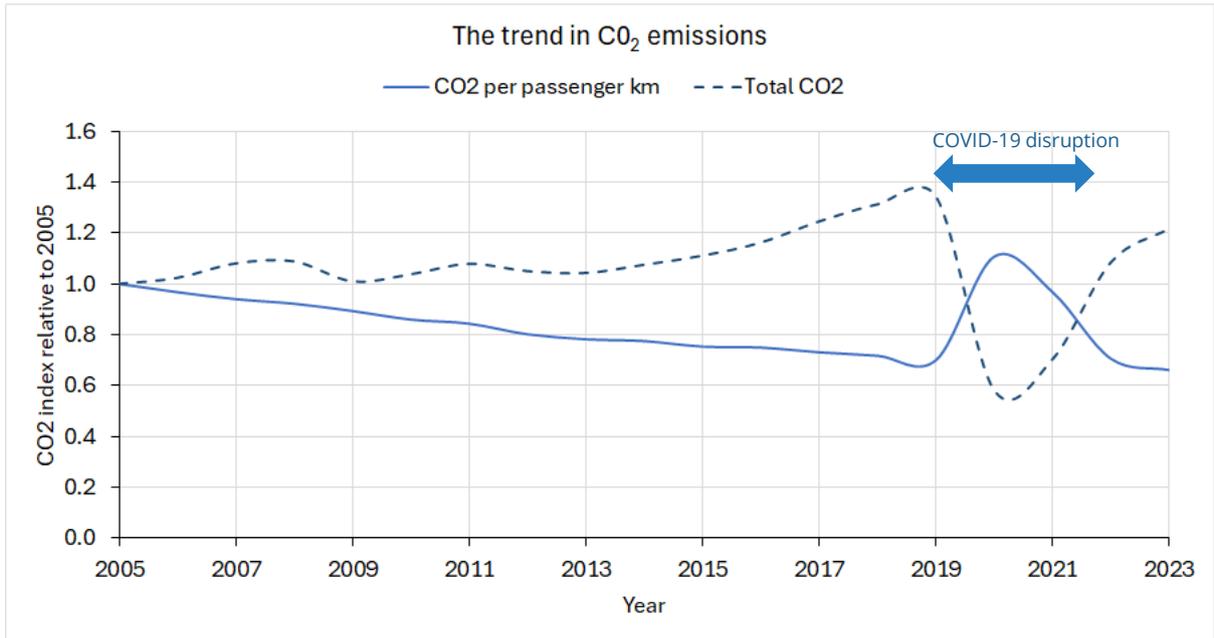


Source: Airbus accident statistics. <https://accidentstats.airbus.com/hull-losses/>

Emissions

Although aviation's CO₂ emissions are increasing because of the growth in the number of flights, flight efficiency is increasing due to a combination of improved engine technology, better management of flight trajectories and sustainable aviation fuels (SAF). The figure below shows the increase in European aviation's CO₂ emissions referenced to a 2005 baseline. The figure also illustrates the improvement in efficiency measured as CO₂ emissions per passenger kilometre flown on European flights. CO₂ emissions per passenger kilometre have reduced by approximately 34% since 2005.

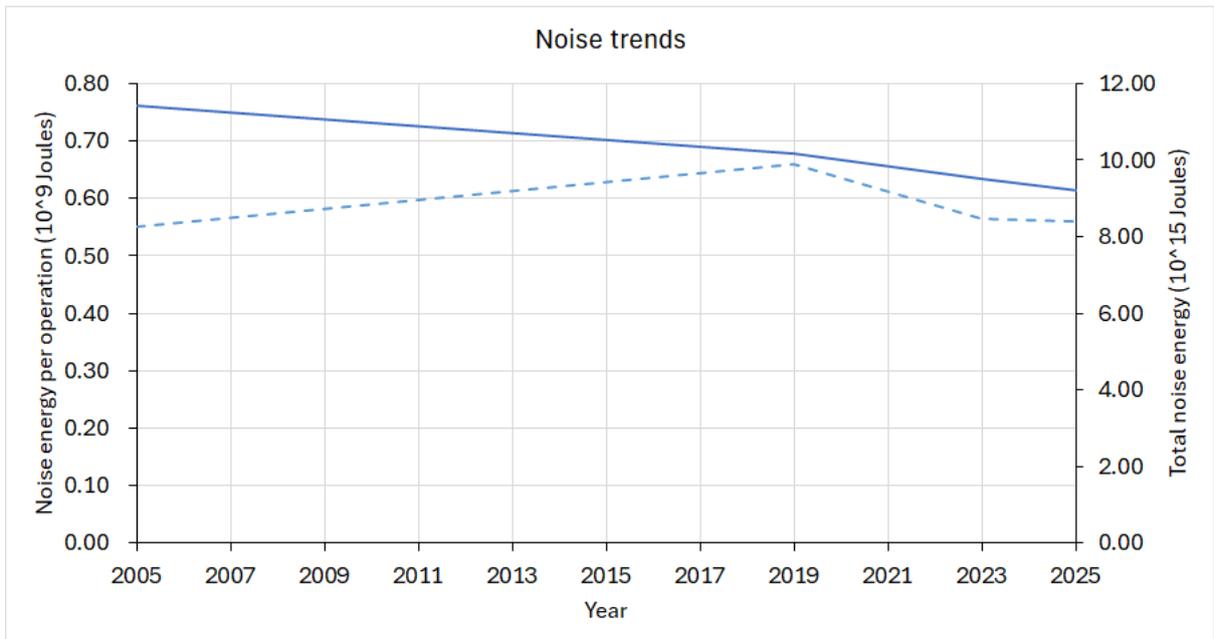
⁴ 10 year moving average hull loss rate (per million flights) per aircraft generation, [Hull Losses – accidentstats.airbus.com](https://accidentstats.airbus.com)



Source: EASA. European Aviation Environmental Report, www.easa.europa.eu/eaer, EAER2025_Fig1-16_combined_indicators

Noise

As an indicator of the trends in aircraft noise, the following figure shows the average noise energy per aircraft movement, arrivals and departures, across European airports. As with emissions, total noise energy increases initially because of the increase in the number of flights but the starts to decrease from around 2019 as aircraft get quieter. The average noise energy per operation has decreased by approximately 17% from 2005.



Source: EASA. European Aviation Environmental Report, www.easa.europa.eu/eaer, EAER2025_ Figure 1.9 Summary of noise indicators (% change to 2005)

Conclusions

The preceding pages confirm the value of the EU Framework Programmes for R&I to the aviation sector in terms of supporting and accelerating the development of products as well as making a considerable contribution to broader societal benefits. Lessons are also learnt on the structure and focus of the FPs.

EREA's position

Based on this and other analysis, EREA has drawn a number of conclusions vis-à-vis the FPs. This position is summarised below.

- The European **FPs for R&I (Horizon Europe and its successor) are the key European instruments** for implementing European visions and strategies. They are supporting cross-border cooperation, maintaining and developing European competitiveness and autonomy in key strategic sectors, such as aviation.
- EREA advocates for a coherent overall strategy, in the form of a **Strategic Research and Innovation Agenda (SRIA) prepared by all aviation sector stakeholders**. Such Strategy was successfully prepared in the past by ACARE, the Advisory Council for Aeronautics Research and Innovation in Europe.
- EREA recommends that the EU-budget for collaborative aviation research in FP10 is **significantly increased** compared to EU-budgets allocated to collaborative aviation research in recent FPs.
- **Increased investment in R&I is crucial** to Europe's future in an era of heightened global competitiveness, where success increasingly depends on the generation and conversion of knowledge into innovation.
- **EREA advocates for the whole R&I chain** and for a strong and well-balanced system in FP10, **without domination of one instrument**. In particular, reaching the climate neutral aviation objective in 2050 will require strengthening bottom-up approach.
- EREA supports the **continuation of collaborative research and public-private partnerships** with strong contributions and cooperation between all stakeholders (e.g. industry, research organizations and universities, operators, etc). These instruments represent the main successes of the current FP and the real added value of EU-wide cooperation.
- EREA calls for **high-level European support for aviation technology infrastructures (TIs)** in FP10.
- **EREA welcomes the Commission's simplification efforts**. If these efforts are to succeed, we recommend revising the current approach in a manner to benefit all involved parties and not compromise European cooperation.

Call to action

Given the importance of the FPs to the European aviation sector, **EREA invites the other actors** involved, including but not limited to universities; industry, both small and medium enterprises

(SMEs) and large industry players; joint undertakings; service providers and operators and public bodies **to come together under the ACARE umbrella** to:

- Continue the **communication and promotion activities essential to raise awareness** of the FP programme's contribution to the success of aviation R&I to policy-makers and the general public alike.
- **Support and influence the development of the next in the series of the Framework Programmes, FP10** due to launch in 2028.

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