European Commission

Safe and green aviation in Europe

The role of the Innovation and Networks Executive Agency

Innovation and Networks Executive Agency

FOREWORD

Aviation is one of Europe's main industries of excellence. It contributes to maintaining close to 5 million jobs and represents over 2% of the European GDP. The continuous growth in the demand for air transport worldwide – forecast at nearly 5% every year until 2030 – will further increase the sector's economic and social impact, but calls for measures to mitigate its environmental footprint, in terms of emissions and noise pollution, as well as to ensure a safe and seamless travel.

The Innovation and Networks Executive Agency (INEA) is addressing these challenges through a growing number of aviation projects supported by two EU funding programmes: Horizon 2020 (H2020) for aviation research and innovation and the Connecting Europe Facility (CEF) for new and more modern aviation infrastructure.

INEA's implementation of H2020 is an important contribution to achieving the EU's aviation strategy goals (in its vision 'Flightpath 2050'), with supporting R&I aviation projects developing cutting-edge technologies aiming to reduce greenhouse gas emissions and noise levels generated by the aircraft. INEA's aviation portfolio also focuses on improving air traffic management, as well as developing seamless and safe air mobility across Europe under the CEF Transport Programme with an indicative €3 billion budget (2014-2020) dedicated for the SESAR (Single European Sky ATM Research) priority.

Between 2014 and 2016, INEA has been supporting the implementation of a € 1.2 billion portfolio of nearly 90 aviation projects, which is set to expand significantly by 2020. More than 400 partners from across the EU (and sometimes beyond) take part in H2020 and CEF projects supported by INEA. This thriving R&I and infrastructure network is a key promoter of the European environmental sustainability and competitiveness in the global economy. Their work and commitment are crucial to increase the competiveness of the EU aviation sector.

In this brochure, we aim to explain INEA's position in the wider landscape of aviation research, innovation and deployment funded by the European Union. We also explore the Agency's role in relation to the relevant policy makers and implementing bodies which are active in the sector, completing the picture by showcasing a selection of projects demonstrating the contribution that INEA is making to support aviation research and infrastructure in Europe.

I hope that you will enjoy the reading and appreciate the relevance of our contribution.

Dirk Beckers
INEA Director

INEA's place in the EU aviation research & innovation

FlightPath 2050

ACARE's Strategic Research and Innovation Agenda for Aviation

DG RTD

Aviation Strategy 2015

Single European Sky

SESAR Deployment Programme

DG MOVE

Horizon 2020

Connecting Europe Facility

CLEAN SKY JU

INEA

Mobility for Growth
International Cooperation
SESAR horizontal priority

SESAR JU

INDUSTRY

SMEs

ACADEMIA

RESEARCH INSTITUTES

PUBLIC BODIES

OPERATORS

EU AVIATION PROGRAMMES

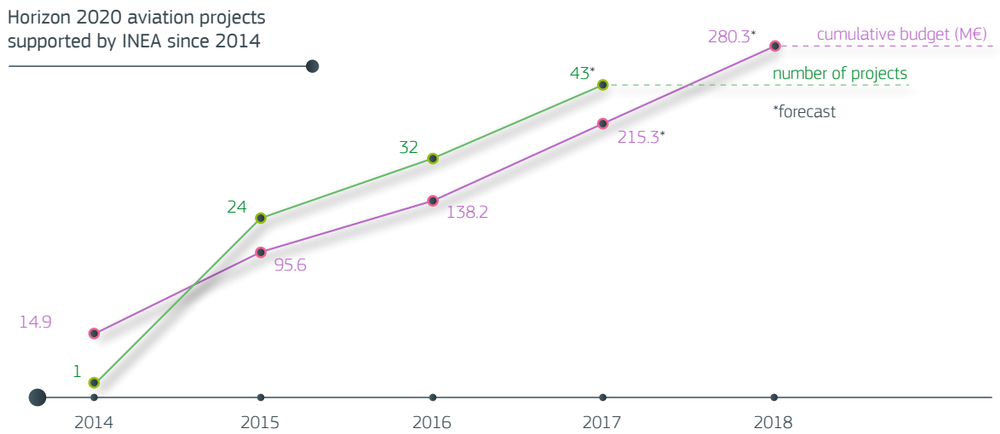
HORIZON 2020
RESEARCH AND INNOVATION FOR SAFER AND GREENER AIR TRANSPORT

INEA manages a growing number of aviation research projects funded by the Horizon 2020 **'Smart, green and integrated transport' challenge.**

Specifically, the funded projects look at:

- Improving the quality and responsiveness of air transportation services, as well as integrating them better with other transport modes
- Maintaining and extending industrial leadership
- Protecting the environment and the energy supply to counterbalance the adverse impact of air transport growth
- Ensuring safety and security both on board and on the ground
- Prioritising research, testing capabilities and education

In order to leverage resources, mitigate risks and effectively contribute to the goals of the European Aviation strategy, some projects involve international cooperation with Canada, China and Japan.



THE CONNECTING EUROPE FACILITY (CEF)
MODERNISING AND HARMONISING AIR TRAFFIC MANAGEMENT SYSTEMS

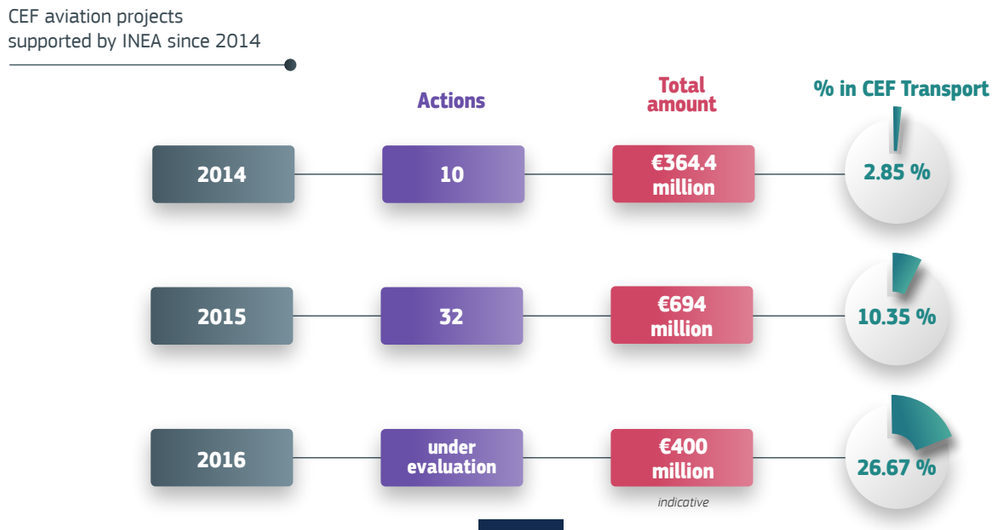
The Connnecting Europe Facility (CEF) is the key EU funding instrument for the development of high performing, sustainable and interconnected Trans-European networks in the fields of transport, energy and telecommunications.

CEF Transport, the €22.4 billion envelope for building and renovating the European transport infrastructure in the 2014-2020 period, supports the European aviation sector through the EU's Single European Sky initiative that works on the safe and efficient use of airspace and air traffic management (ATM) system within EU. The programme's **SESAR Priority** (Single European Sky ATM Research and Development) supports the initiative with an indicative budget of €3 billion over the same time frame.

The priority's target is to improve the performance of ATM in Europe by modernising and harmonising ATM systems, synchronising the deployment of essential ATM functionalities, enhancing civil-military interoperability, reducing fragmentation and consolidating the provision of air navigation services. Furthermore, the Programme's 'Urban Nodes' priority provides funding for studies to link airports and urban centres.

In addition to grants, CEF offers support to projects through innovative financial instruments, such as guarantees and project bonds which help attract further public and private funding.

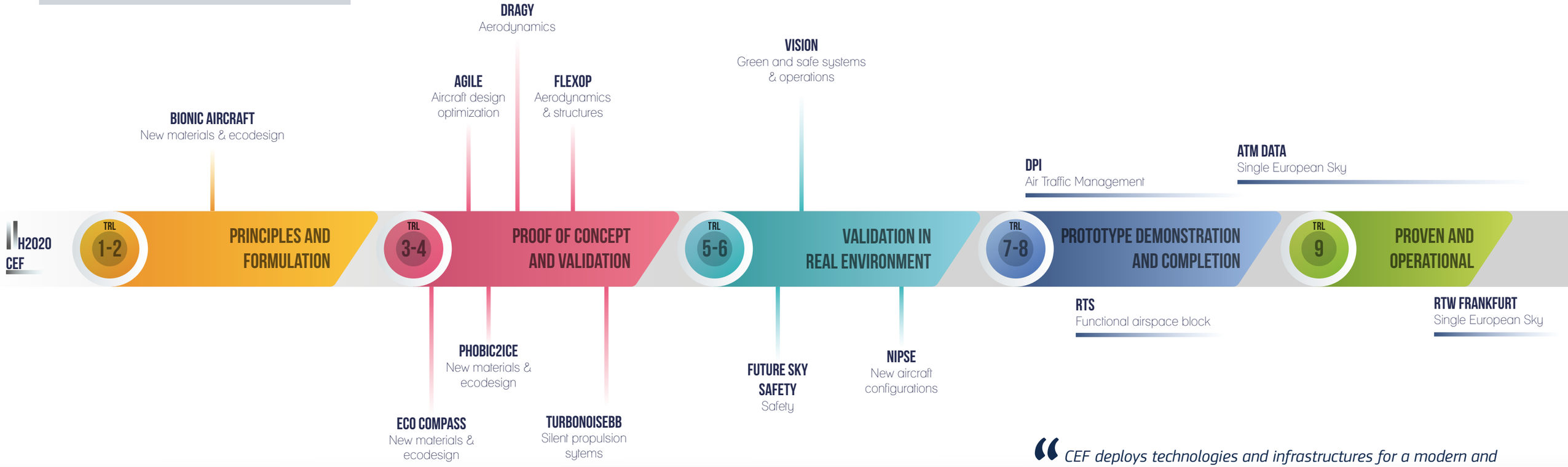
Over the last few years, the portfolio of CEF projects has rapidly grown to 33 projects supported with €694 million from the EU, with an additional indicative €400 million earmarked for new projects. Ten more projects under the 'Urban Nodes' priority, supported with €59 million in EU funds, are working on connecting airports to urban centres in Finland, France, Germany, Italy, Spain and United Kingdom.



AVIATION PROJECTS

FROM IDEA TO MARKET ROLL-OUT

INEA's aviation portfolio includes a wide range of R&I and infrastructure development projects covering the whole innovation lifecycle from idea to the market. In more scientific terms, these projects stretch across all technology readiness levels (TRL).



"INEA supports state-of-the-art research on various aviation domains, such as propulsion, eco-materials, aerodynamic noise, safety, among others. The Horizon 2020 Framework Programme supports projects conceiving breakthrough technologies up to validating prototypes in the real environment. All these projects are contributing to designing the aircraft of the future!"

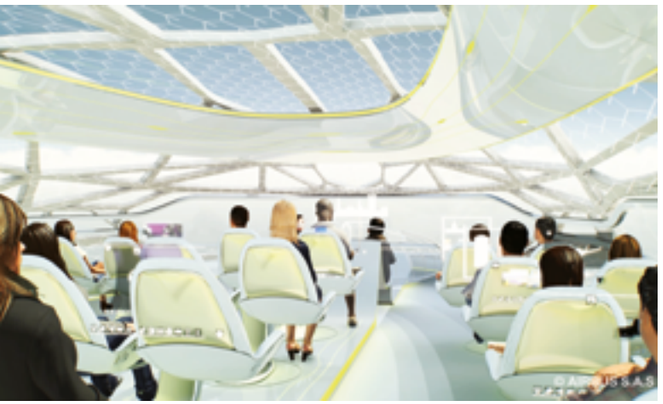
Alan Haigh, Head of H2020 Department (INEA)

"CEF deploys technologies and infrastructures for a modern and more efficient European ATM System. INEA plays its part to make the Single European Sky happen!"

Andreas Boschen, Head of CEF Department (INEA)

BIONIC AIRCRAFT

Increasing resource efficiency of aviation through implementation of ALM technology and bionic design in all stages of an aircraft life cycle



© Airbus

BIONIC AIRCRAFT develops new technologies, methodologies and concepts for the aircraft's additive manufacturing (AM). In particular, the project is working on new design concepts and materials that can boost the weight saving potential of AM, as well as new concepts for quality control, repair, recycling and spare parts logistics.

The project is expected to significantly develop the AM sector and enhance its application in civil aircrafts. This will help reduce the aircraft's weight by up to one ton in the medium term and develop completely new types of aircrafts with weight saving potential of 30% in the long term, leading to important reduction of emissions. Due to the resource efficiency of AM technologies and new possibilities for spare parts logistics, the environmental impact will be further reduced.

09/2016 — 08/2019

Horizon 2020 Mobility for Growth
LZN Laser Zentrum, Germany
€6.4 million
www.bionic-aircraft.eu

Call Coordinator EU contribution Website

ECO-COMPASS

Ecological and Multifunctional Composites for Application in Aircraft Interior and Secondary Structures

© Shutterstock

ECO-COMPASS develops and assesses multifunctional and ecological improved composites from bio-sourced and recycled materials for application in aircraft secondary structures and interior. The project bundles the knowledge of Chinese and European participants to improve ecological balance of materials currently used in aviation.

By maturing ecological improved composites, ECO-COMPASS addresses environmental challenges such as materials sustainability, production costs and waste treatment in the aviation industry with possible applications in automotive, rail and maritime transport. The project enables a unique leverage of resources, reinforces a long-term relationship of China and Europe in aeronautics and allows mitigation of risks in the eco-composites development and production.

04/2016 — 03/2019

Horizon 2020 Mobility for Growth
(Coordinated with People's Republic of China)
Deutsches Zentrum für Luft- und Raumfahrt (DLR),Germany
€1.9 million
www.eco-compass.eu

Call Coordinator EU contribution Website

AGILE

Aircraft 3rd Generation MDO for Innovative Collaboration of Heterogeneous Teams of Experts

© AGILE

AGILE develops the next generation aircraft multidisciplinary design and optimisation processes, which target significant reductions in aircraft development costs and time to market, leading to cost-effective and greener aircraft solutions. The project will deliver efficient cross-organisational design and collaboration techniques, enabled by the AGILE development paradigm.

When a project for a new aircraft is initiated, designers need to integrate expertise in multiple disciplines into the overall development process in order to deliver the optimum aircraft product. Disciplinary competences are in constant interaction with each other, and provided by specialised teams distributed in different organizations. AGILE's ambitious goal is to achieve the reduction of 20% in time to converge the design of an aircraft and 40% in time needed to set up and solve the multidisciplinary development task in a team of various specialists.

06/2015 — 05/2018

Horizon 2020 Mobility for Growth
Stichting Deutsches Zentrum für Luft- und Raumfahrt (DLR),Germany
€7.1 million
www.agile-project.eu

Call Coordinator EU contribution Website

PHOBIC2ICE

Super-IcePhobic Surfaces to Prevent Ice Formation on Aircraft

© Shutterstock

The natural phenomenon of ice accretion can seriously hamper functioning of aircraft. On-the-ground de-icing involves harmful chemicals with a considerable environmental footprint. The PHOBIC2ICE project develops technologies and predictive simulation tools for avoiding or mitigating this phenomenon. Several types of polymeric, metallic and hybrid coatings using different deposition methods will be developed, and laser-treated and anodised surfaces prepared.

The project will provide better understanding of the ice accretion process on different coatings and modified surfaces. The proposed solution will be environmentally-friendly, and will reduce energy consumption and pollution.

The feasibility of specimens of surfaces will be demonstrated at TRL 6 by applying coatings to selected full-scale component elements in an industrial environment, followed by testing under conditions replicating an operational environment.

02/2016 — 01/2019

Horizon 2020 Mobility for Growth (Coordinated with Canada
TECHNOLOGY PARTNERS, Poland
€1.8 million
www.phobic2ice.com

Call Coordinator EU contribution Website

DRAGY

Drag Reduction in Turbulent Boundary Layer via Flow Control

© Shutterstock

The DRAGY project works on aircraft drag reduction through flow-control techniques. Almost 50% of the total aircraft's drag is related to the friction drag. Studies on the aircraft and flow interactions, together with developments of advanced flow control technologies, can effectively reduce the total drag by 15%.

By making use of experimental facilities and new algorithms for exploiting efficiently large computing capabilities, the project is improving the understanding of the underlying physics behind the control techniques, and the interaction of these with the boundary layer to maximise their efficiency.

The combination of simulation, understanding and micro-actuation technologies offer new opportunities to significantly decrease drag, and by doing so, increase fuel efficiency of future aircraft.

04/2016 — 03/2019

Horizon 2020 Mobility for Growth
(Coordinated with People's Republic of China)
CIMNE, Spain
€1.8 million
www.cimne.com/dragy

Call Coordinator EU contribution Website

FLEXOP

Flutter free flight envelope expansion for economical performance improvement

© Flexop

The FLEXOP project develops ground-breaking multidisciplinary aircraft design capabilities for Europe that will increase competitiveness with emerging markets, particularly in terms of aircraft development costs. A closer coupling of wing aeroelasticity and flight control systems in the design process opens new opportunities to explore previously unviable designs. Common methods and tools across the disciplines also provide a way to rapidly adapt existing designs into derivative aircraft, at a reduced technological risk (e.g. using control to solve a flutter problem discovered during development).

These inter-disciplinary capabilities will improve the design cycle and the verification & validation process of both derivative and new aircraft. Better control of development and certification costs can be achieved if these capabilities are used to address problems early in the design process.

06/2015 — 05/2018

Horizon 2020 Mobility for Growth
MTA-SZTAKI, Hungary
€6.7 million
https://flexop.eu/

Call Coordinator EU contribution Website

TurboNoiseBB

Validation of improved turbomachinery noise prediction models and development of novel design methods for fan stages with reduced broadband noise

© Shutterstock

The TurboNoiseBB project develops concepts and technologies to reduce aeroengine noise, such as fan broadband noise (BBN), at source. The project will enable a major technical leap based on an improved understanding of the broadband noise source mechanisms and validated broadband noise prediction methods.

In particular, TurboNoiseBB will contribute to major improvements in the noise emission of turbofan engines entering into service after 2025. The project will deliver validated generation three noise reduction concepts and associated trade-off parameters to pave the way for the demonstration.

09/2016 — 02/2020

Horizon 2020 Mobility for Growth

Deutsches Zentrum für Luft- und Raumfahrt (DLR),Germany

€6.7 million

http://cordis.europa.eu/project/rcn/204768_en.html

Call Coordinator EU contribution Website

FUTURE SKY SAFETY

Future Sky Safety

© Shutterstock

Future Sky Safety is the largest ongoing European aviation safety research and innovation project. It conducts breakthrough research that will help reduce overall safety risks, improve the safety under unanticipated circumstances, decrease the effect of external hazards and enhance the safety of the cabin environment.

The project contributes significantly to the ambitious EU's goal of reducing the number of commercial aircraft flight accidents to less than one per 10 million departures, and the overall accident rate for specific operations by 80% compared to 2000. It also helps to coordinate the research and innovation agendas of European countries and institutions, thereby enhancing coherence and efficiency of the European aviation safety research.

01/2015 — 12/2018

Horizon 2020 Mobility for Growth Stichting

Nationaal Lucht- en Ruimtevaartlaboratorium (NLR), Netherlands

€14.9 million

www.futuresky.eu/projects/safety

Call Coordinator EU contribution Website

NIPSE

Novel Integration of Powerplant System Equipment

© Therry Schneider/Safran

The project targets the challenges of equipment integration on future aircraft powerplants - particularly future Ultra-High Bypass Ratio (UHBR) powerplants. It seeks to find better placement options for equipment, considering the engine, nacelle and the aircraft locations; addressing installation limitations expected in these powerplants, whilst improving the equipment itself, including thermal management.

By finding ways to quickly optimise the equipment locations, reducing the equipment volume, and improving its effectiveness, the project will enable equipment integration into the UHBR powerplant. NIPSE targets a 15% reduction of equipment volume, shorter development time, weight savings and improved thermal management, enabling UHBR powerplants to achieve their potential fuel savings of up to 2-3%.

06/2015 — 05/2018

Horizon 2020 Mobility for Growth
Safran Nacelles SAS, France
€6.2 million
www.nipse.eu

Call Coordinator EU contribution Website

VISION

Validation of Integrated Safety-enhanced Intelligent Flight Control

© Shutterstock

VISION is a Europe-Japan collaborative research project, which is developing and validating smarter technologies for aircraft Guidance, Navigation and Control (GN&C) by integrating onboard vision system and advanced fault detection and resilient methods. The proposed GN&C solutions will allow an aircraft to automatically recover from anomalies, such as actuator/sensor failures, to ensure flight safety.

VISION aims at contributing to the global civil aviation goal of aircraft accident rate reduction. For that, VISION focuses on GN&C recovery scenarios during the critical flight situation, namely final approach and landing where nearly half of fatal accidents in the last decade have occurred. The project will result in flight-validated advanced GN&C solutions with increased TRL, with benefits to the European and Japanese aircraft industry.

03/2016 — 02/2019

Horizon 2020 Mobility for Growth
(Coordinated with Japan)
Office National d'Etudes et de Recherches Aerospatiales (ONERA), France
€1.8 million
http://w3.onera.fr/h2020_vision

Call Coordinator EU contribution Website

SDM

SESAR Deployment Manager Clusters

© Shutterstock

The four on-going clusters of implementation projects work on technological improvements to enhance the performance of the European Air Traffic Management system in the short to medium term. Their role is to coordinate the deployment of 222 individual projects covering five air traffic management functionalities:

- Extended arrival management and performance based navigation in high density terminal manoeuvring area implementation
- Airport integration and throughput implementation
- Flexible airspace management and free route implementation
- Network collaborative management implementation
- Initial system-wide information management implementation

The four clusters are implemented by 68 beneficiaries in 24 EU member states, as well as four countries outside the EU.

01/2014 — 12/2020

2014 Connecting Europe Facility for Transport
SESAR Deployment Manager (SDM), EU
€843 million
www.sesardeploymentmanager.eu

Call Coordinator EU contribution Website

ATM Data

ATM Data ‘as a service’

© Shutterstock

The project develops and deploys a prototype to show that air traffic management (ATM) data can be provided as a service by one ATM system to one or more other civil air traffic service units. It studies how to upgrade an existing IT infrastructure so that it can deliver services with proper contingency and disaster recovery and will determine the impact of this development for main ATM systems.

ATM Data contributes to the ongoing SESAR studies on common ATM services, as well as the assessment of the technical feasibility and benefits of virtual ATM centres at a European level.

01/2014 — 12/2017

2014 Connecting Europe Facility for Transport
Slovenia Control, Slovenia
€2.5 million
www.sloveniacontrol.si and www.eurocontrol.int

Call Coordinator EU contribution Website

RTS

Remote Tower Services – RTS, Pilot operations

© RTS

Control towers are often too costly for airports with low passenger traffic (less than 1 million per year) and can be safely replaced by remote tower services (RTS). The RTS project deploys this innovative solution developed and validated by SESAR on three pilot locations in Sweden: Örnsköldsvik, Sundsvall and Linköping. The project carries out studies and works covering engineering, installation, validation and approval for operation from national regulator and installing a common tower service centre in Sundsvall.

The project will build the grounds for operational and technical standards, and regulatory guidance on RTS. It will also increase the general trust and acceptance among air traffic controllers, paving the way for further deployment in the EU.

Further similar projects to expand remote tower services and to deploy remote tower control are currently also being implemented in Germany and Sweden.

01/2014 — 12/2017

2014 Connecting Europe Facility for Transport
Luftfartsverket, Sweden
€4.8 million
www.lfv.se

Call Coordinator EU contribution Website

RTW FRANKFURT

Planning of Regionaltangente-West (RTW) in Frankfurt

© Shutterstock

The project aims to prepare all required planning documents (technical, environmental, economic and financial) and to organise public participation activities for the creation of a direct rail link connecting the area west of Frankfurt with the airport and the rest of the city. Once completed, the RTW Frankfurt project will lead to substantial improvements in passenger rail connections in the Frankfurt area, as well as boosting intermodality and contributing to shifting traffic away from the road network.

01/2014 — 12/2017

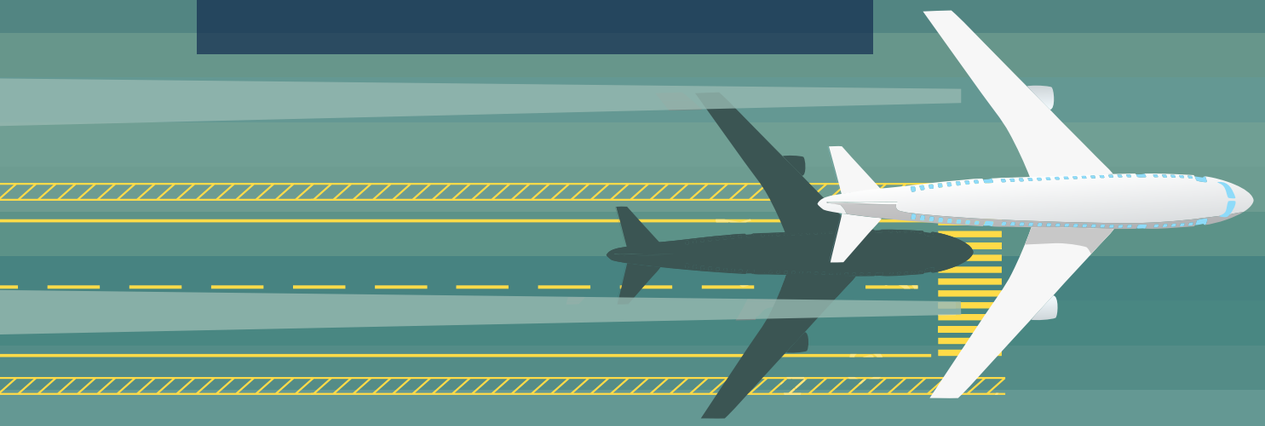
2014 Connecting Europe Facility for Transport
RTW Planungsgesellschaft mbH, Germany
€7.7 million
www.rtw-hessen.de

Call Coordinator EU contribution Website

The Innovation and Networks Executive Agency

INEA is an Executive Agency established by the European Commission to implement parts of EU funding programmes for transport, energy and telecommunications. The Agency's mission is to provide its stakeholders with expertise and high-level programme management, whilst promoting synergies among programmes, in order to benefit economic growth and EU citizens.

INEA supports EU aviation activities together with the European Commission's Directorates-General for Mobility & Transport (DG MOVE) and Research & Innovation (DG RTD), as well as with the Clean Sky Join Undertaking (JU) and the SESAR JU. The Agency's key role is to turn aviation policy set by the Directorates-Generals into R&I and infrastructure projects.



Horizon 2020
Since January 2014, INEA is the gateway to funding under the Horizon 2020 Societal Challenges **'Smart, green and integrated transport'** and **'Secure, Clean and Efficient Energy'** with a total budget of €6.7 billion (€2.9 billion for transport and €3.8 billion for energy) to be granted by end 2020.

With a €161 million budget that is available in 2016-2017 under the **Mobility for Growth** call, INEA total contribution to the EU's aviation projects will be **€280 million** by mid-2018.

There are further H2020 funding opportunities in the field of aviation research, supported by the Clean Sky Joint Undertaking (www.cleansky.eu) and SESAR Joint Undertaking (www.sesarju.eu).

Connecting Europe Facility
INEA implements most of the CEF programme budget, **in total €27.4** out of €30.4 billion (€22.4 billion for transport, €4.7 billion for energy, and €0.3 billion for telecommunications).

INEA's aviation portfolio under the CEF Transport programme focuses on **improving air traffic management**, as well as **developing seamless and safe air mobility across Europe** under the CEF Transport programme with an indicative budget of up to 3 billion (2014-2020) dedicated to the SESAR priority.

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