

## Clean Sky 2: developing new generations of greener aircraft

- New environmentally friendly technologies for next generation aviation;
- Speeding up development of technology demonstrators;
- Underpinning European international aviation competitiveness;
- New market opportunities and jobs.



### What is the challenge?

Air transport contributes today about 3% to global greenhouse gas emissions, with traffic expected to triple by 2050. Although other sectors are more polluting (electricity and heating produces 32% of greenhouse gases), this expected growth makes it necessary to address aviation's environmental impact. Meeting the EU's climate and energy objectives will require a drastic reduction of the sector's environmental impact by reducing its emissions. Maximising fuel efficiency, using less to go farther, is also a key cost-cutting factor in a very competitive industry – and as air traffic increases, better noise reduction technologies are needed. But game-changing innovation in this sector is risky, complex and expensive, and requires long-term commitment. This is why all relevant European stakeholders must work together to develop proof-of-concept demonstrators.

### What is the Clean Sky 2 (CS2)?

CS2 is a Joint Technology Initiative (JTI), a public-private partnership bringing together companies, universities, public laboratories, innovative SMEs and the European Commission. It develops and demonstrates break-through technologies for the civil aircraft market to cut aircraft emissions and noise, and secure the future international competitiveness of the European aviation industry.

The new CS2 JTI runs from 2014 to 2024. It brings together Europe's aeronautics industrial leaders and public research organisations.

### What results and benefits do we expect?

The technologies developed under CS2 will reduce environmental pollution and noise levels and will therefore improve the quality of life. The close collaboration between the partners of CS2 will accelerate the pace of technological progress and create a mutual win-win situation.

CS2 will help Europe's aeronautics sector remain competitive. Europe currently has a world market share of 40% and the global aviation sector is expected to grow by 4-5% per year. But faced with fierce competition Europe needs to develop new technologies to create new market opportunities and new highly specialised jobs. For stakeholders in the EU-13 countries the new, enlarged JTI offers more opportunities to participate in building the best technologies.

### Specific objectives include:

- increasing aircraft fuel efficiency, thus reducing CO<sub>2</sub> emissions by between 20 to 30%; and
- reducing aircraft NO<sub>x</sub> and noise emissions by between 20 to 30% compared to "state-of-the-art" aircraft entering into service as from 2014.

## How much will it cost?

The budget of CS2 is €4 billion. The EU contributes €1.8 billion from the Horizon 2020 programme budget. Industrial partners contribute €2.2 billion, €1 billion of which will come through additional activities that are not included in the work plan of the JTI but that support the achievement of its objectives.

## How will it be run?

JTIs are partnerships between the EU and industry. They establish their own strategic research agendas. The new CS2 JTI is managed by a dedicated Joint Undertaking whose Governing Board comprises representatives of the European Commission and Aeronautics Industry.

40% of the funds is earmarked for the founding members of CS2 who lead the technical programme and commit for the whole duration. 30% is to be allocated to core partners, selected through open calls at the start of the programme, which will become full Members of the Joint Undertaking. The remaining 30% of funding will be distributed in annual open calls to support the specific tasks.

## What has the current JTI achieved so far?

It is estimated that the technology developments already made or in progress could reduce aviation CO<sub>2</sub> emissions by more than 20% with respect to Year 2000 baseline levels (an aggregate reduction of 2 to 3 billion tonnes of CO<sub>2</sub> over the next 35 years).

All technologies and demonstrators developed in the Clean Sky programme will represent major steps forward. Examples so far include the Open Rotor, laminar wings, innovative rotor blades and high compression engine for light helicopters, innovative ice detector sensors and advanced avionics systems.

CS JTI was set up in 2008 as Europe's largest ever aeronautics research programme (budget €1.6 billion). It has already brought together over 560 participants, with around 40% being SMEs.

## New technologies to reduce aircraft emissions and noise

A number of potential breakthrough technologies were successfully tested in wind tunnels in 2012. One of these is the so-called Natural Laminar Flow wing. This new wing has the potential to substantially reduce drag and provide more than 4% in fuel savings, but requires extensive changes to conventional wing design and manufacturing concepts, making these tests vital to further development. Two other innovative technologies developed under Clean Sky, the Open Rotor (an innovative type of aircraft engine) and Flight Management Functions (flight deck equipment) geared towards optimising flight trajectories to further cut CO<sub>2</sub> and noise, were also successfully tested in a wind tunnel and demonstrated first level of maturity. Very positive aero-acoustic tests of Open Rotor blades were made in wind tunnels, while on the side of classic engine architectures, technological breakthroughs were tested on complete engine models.

More information:

On Natural Laminar flow

[www.cleansky.eu/content/page/sfwa-demonstrators](http://www.cleansky.eu/content/page/sfwa-demonstrators)

On Open Rotor

[www.cleansky.eu/content/page/sage-1-%E2%80%93-open-rotor](http://www.cleansky.eu/content/page/sage-1-%E2%80%93-open-rotor)

[www.cleansky.eu/content/page/sage-2-%E2%80%93-geared-open-rotor](http://www.cleansky.eu/content/page/sage-2-%E2%80%93-geared-open-rotor)

Skyline magazine

[www.cleansky.eu/sites/default/files/documents/skyline-12-01\\_0.pdf](http://www.cleansky.eu/sites/default/files/documents/skyline-12-01_0.pdf)



Open Rotor: Clean Sky's innovative aircraft engine demonstrator

## Useful links

Clean Sky: [www.cleansky.eu](http://www.cleansky.eu)

ITD leaders: [www.cleansky.eu/content/homepage/about-us](http://www.cleansky.eu/content/homepage/about-us)

ACARE: [www.acare4europe.com](http://www.acare4europe.com)

ASD: [www.asd-europe.org](http://www.asd-europe.org)