Environment Matters
for the future of aerospace
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50 years of innovation

Air travel is an invaluable global asset and is projected to grow to a $4.6 trillion worldwide market within the next 20 years. In the past 50 years, air transport has brought more and more people closer together and delivered technology once unthinkable.

But the last half century has also opened our eyes. Fifty years ago, we did not know much about the impact that aviation has on our natural environment and how our daily choices affect our planet. Celebrating our 50th anniversary this year, we are making bold moves and commitments to sustainable air travel.

From 2020 onward, we are on a global path to cap net carbon emissions through carbon-neutral growth as part of the Air Transport Action Group (ATAG). And by 2050, we have made the commitment to bring CO₂ emissions to half of 2005 levels. A new generation of cleaner technology, research and development, and our total respect for the planet lay the foundation for a more sustainable aviation industry.

By demanding more of ourselves in the areas of research, supply, production and operations, we can demand less of our planet. This clears the path toward a future in which we can connect more people than ever before, in the most sustainable way possible.

Sincerely yours,

GUILLAUME FAURY
CEO Airbus
Our planet’s ecosystems, which we all depend upon, are at risk due to the degradation of natural resources and climate change. We take our contribution from our airplanes seriously and are making sustainable solutions take flight at Airbus.

HUBERT MANTEL
Head of Airbus Environmental Affairs

Thanks to a collaborative project facilitated by the European Commission, Clean Sky, we developed the Bluecopter Demonstrator, the quietest helicopter worldwide in its weight category. Breakthrough technologies like these will make air travel quieter and lighten its impact on air quality, something we all care about.

ROXANE RANDAZZO
Environmental Affairs, Airbus Helicopters

Our business generates solutions to meet current and future environmental challenges by offering products such as Zephyr, the world’s leading solar-electric satellite, and earth observation satellites that enhance weather forecasting and climate change monitoring.

FEDERICA CANTATORI
Environmental Affairs, Airbus Defence and Space
If time travellers from the 1960s showed up at an airport today, plenty might surprise them. But the aircraft themselves would look almost the same. Several advancements have taken place beneath the hood of our aircraft – with far-reaching implications for how we live, travel and interact.
Aviation is one of the main drivers behind globalisation, supporting almost 65.5 million jobs worldwide and worth 3.6% of the global GDP. With more than 4 billion passengers travelling by air every year, aviation is the glue that brings people together.

The global aviation industry has a 2% share of all human-induced CO₂ emissions.

Aircraft today are 75% quieter than in the 1960s.

Airbus has 27 satellites in orbit for climate change monitoring.

Airbus R&D efforts (more than €2 billion annually) focus on aircraft efficiency and the reduction of CO₂ emissions.

65.5 million jobs worldwide

3.6% of the global GDP

4 billion passengers were transported in 2018
But with growing demand we are also demanding more of our planet. Just 50 years ago, at the cusp of the Airbus story, little data existed on the impact of air travel on our planet. However, we have already made significant progress in reducing our environmental impact. Since our first generation of commercial jets, fuel and CO₂ emissions have been cut by more than 80% per seat kilometre, NOₓ emissions by 90% and noise by 75%. Currently, the aerospace sector is surpassing its first goal of reaching an average annual fuel efficiency of 2.1% over the last decade. Putting things into perspective, we have avoided over 10 billion tonnes of CO₂ since 1990 through a combination of new technology, operational efficiencies and infrastructural improvements, which includes a $1 trillion investment in 12,200 new aircraft since 2009.

### Key industry figures

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<th>Environmental Impact</th>
<th>Percentage Decrease</th>
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<tr>
<td>Noise</td>
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<td>Fuel and CO₂ emissions</td>
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- **CO₂ avoided**: ≈ 10 billion tonnes since 1990
- **Investment**: $1 trillion in 12,200 new aircraft since 2009
- **Annual fuel efficiency**: 2.1%
Amongst the various mitigation actions to reduce CO\text{2} emissions, one key element is the International Civil Aviation Organisation agreement of 2016. Within this agreement, the aviation industry is working together with governments and civil society to implement the world’s first mandatory sector-wide measure for offsetting the growth of international aviation CO\text{2} post 2020. Plenty has been achieved since starting out 50 years ago, but with the world fleet set to double in the next 20 years, a joint effort is needed to support our planet.

“...for offsetting the growth of international aviation CO\text{2} post 2020.”

Since the \textbf{1960s}, CO\text{2} emissions per seat kilometre \textbf{have been reduced by 80\%}.

\textbf{In 2005, Airbus} was the first manufacturer to develop new \textbf{environmental standards} for end-of-life aircraft handling.

\textbf{Airbus} is developing a vision for the next decade \textbf{to reduce the environmental impact of its industrial operations}.

\textbf{Airbus} was the first aircraft manufacturer to be certified under \textbf{ISO 14001} for all its sites, products and services.

Each year, \textbf{Airbus collects, consolidates and reports on its environmental performance} and makes it public.
Climate change spells turbulent times ahead for the aerospace industry: from rising temperatures preventing take-offs, to increased payload restrictions, to bumpier flights. Our warming planet is already affecting how we travel – and it will continue to do so.
As a global leader, it is our responsibility to take part in the conversation on climate change and contribute to the targets set by the Paris agreement. This has led us to update our environmental policy to further drive sustainable operations. On a continuous basis, we also work to improve the environmental management systems (EMS) for our sites, products and services – and track these with rigorous annual assessments.

In 2008, Airbus committed to the ATAG CO\textsubscript{2} emission goals: By 2050, CO\textsubscript{2} emissions will be half of what they were in 2005.

Since 1990, over 10 billion tonnes of CO\textsubscript{2} have been avoided by way of new technology, operational efficiencies and infrastructural improvements.

Airbus has been continuously working on its industrial footprint since 2006 to reduce energy, CO\textsubscript{2}, water, waste and VOCs with more than a 50% reduction in all areas (by 2016).

Airbus plays a leading role in the EU’s Clean Sky 2 initiative, which aims to develop innovative technologies to reduce CO\textsubscript{2}, NO\textsubscript{x} and noise emissions.

For the Clean Sky initiative, Airbus’ BLADE airliner tests wing characteristics in flight, aiming to reduce wing friction by 50% and CO\textsubscript{2} emissions by 5%.
New thinking, new possibilities

Our worldwide partnerships are central to our efforts in environmental protection.

As a founding member of the International Aerospace Environmental Group (IAEG), we help promote global standards for greenhouse gas emissions reporting, substances management and substitution technologies. And together with airlines, airports and air traffic management, we are working to reach the Air Transport Action Group’s (ATAG) goal of reducing aviation emissions by 2050 to half of what they were in 2005. A further pillar of the industry’s climate action plan is CORSIA, the first global offsetting scheme with the aim of reaching carbon-neutral growth from 2020 onwards (CNG2020).
Next to improvements in air traffic management that can reduce CO₂ emissions by 10% per flight, we place a high priority on fuel efficiency services to reduce our customers’ fuel burn. However, electric and hybrid-electric propulsion technologies are the true focus of our research efforts, as they promise exciting environmental benefits. We have collaborated with partner companies in this area to develop a near-term flight demonstrator to test hybrid-electric-powered commercial flights, allowing us to deep dive into sustainable ways to reduce emissions.

Aligned with ATAG’s mission, Airbus is committed to improving fleet fuel efficiency by 1.5% per year.

Airbus is committed to halving net aviation carbon emissions by 2050.

With trusted partners, Airbus is developing a near-term flight demonstrator to test hybrid-electric-powered flights.

Airbus satellites fight global warming from space by verifying sustainable forest management.

New production methods like 3D printing help deliver lighter parts that produce much less waste and preserve valuable resources.
Corporations across industries are increasingly realising how essential their employees are as stakeholders in the conversations driving their business. At Airbus, this is no exception. The people who work here see sustainability in the aerospace industry as more than just a topic of discussion during working hours. Focus on environmental responsibility extends to their personal lives, and even into non-work-related conversations and activities. At their core, Airbus people value conserving resources, driving them to make smart choices in the way they choose to travel and consume as well as the causes they support.
**Airbus employees** formed a rally racing team that uses CFRP industrial waste to build buggy body panels, testing how to create new components from recycled composites.

**Airbus** is a partner in the COMMUTE initiative in Toulouse, delivering innovative solutions for urban mobility and the reduction of CO₂ emissions.

According to a 2018 survey, 11% of the Airbus Toulouse-based employees cycle to work. An annual event is organised by the company to spread the initiative.
More than 130,000 people strong, we embrace an outward-looking mindset that transcends geographical borders. By fostering collaboration and a strong focus on well-being in the work environment, we empower our employees to share ideas and new methods of tackling tomorrow’s environmental challenges in all areas of their lives.
That also means taking part in the ongoing conversation on climate change. Around 85% of Airbus employees work under the framework of ISO 14001, which provides practical tools for the management of our environmental responsibility. From promoting low-impact ways of commuting to work, to broader, hands-on initiatives like those mentioned on the right, climate awareness has become a cornerstone of our operations.

Airbus’ CTO developed an app with which employees can calculate their footprint and reduce emissions by choosing a “green” commute to work, via cycling, car sharing and public transportation.

In Broughton, UK, the “Waste Less, Give More” campaign involved reusing materials to meet a lower spending target, with savings (£10,000) given to local charities.

Around 85% of Airbus employees operate under the framework of ISO 14001.
In 2017, we hit our ambitious target for sustainable aviation — what we refer to as “2020 Vision” — three years ahead of schedule. Through our revenue-based environmental footprint reduction plan within this vision, we had reduced our CO₂ emissions by 14%, water consumption by 46% and volatile organic compounds (VOC) emissions by 60%. But our 2030 goals were already on the horizon.
Led by our 2030 vision, a separate plan to reduce our global footprint covers all Airbus activities in Europe, from infrastructure processes, to air and water quality improvement, to IT equipment. All our sites and functions orientate themselves towards this initiative for both short and long-term goals, making sure that each area achieves its objectives while staying ahead of the curve.

Our cross-functional approach across facility management, manufacturing, procurement and engineering proves that collaboration across the entire value chain is key to the proper implementation of environmentally friendly, innovative solutions. Together with our suppliers, we adopt innovative approaches that improve our overall environmental impact, placing a particular focus on the management of hazardous substances.

At the Grand Prairie Airbus Helicopters site in the US, solid waste sent to landfills was reduced by 90% by diverting it to an energy recovery facility.

Over 20,000 litres of oil have been saved at the Broughton, UK, location by modifying spindles to eliminate lubricant leakage.

VOC emissions have been reduced by over 15 tonnes annually in Nantes by switching from liquid cleaning solutions to sprays and wipes.

In Illescas, Spain, Airbus facilities are treating water through osmosis to save more than 12,000 cubic metres of industrial water discharges every year.

Surface treatment in production: 25 tonnes of chromates have been removed from the Broughton facility.
From responsible recycling to safer substances

Keeping the entire value chain in mind involves more than just close collaboration with suppliers. Thinking of downstream waste is also crucial. Between 2006 and 2017, we reduced our non-recyclable waste production by 42%, based on revenue. From improving titanium scrap management and increasing metal recycling to heavily investing in new manufacturing technologies and optimising the end-of-life dismantling of aircraft, there are significant efforts in place.
Together, teams from across maintenance, safety, facility management, and hygiene follow the EU Waste Framework Directive, which puts in place rules for reducing the amount of raw materials used, for the reuse of materials, and for recycling waste into new products.

On top of that, we are also moving towards low or zero-VOC products in our day-to-day operations to meet our environmental footprint reduction plan. Across all our sites, a 60% reduction in VOC emissions has already been achieved: pre-impregnated wipes have replaced solvents, and new waterborne paints make for a low-VOC alternative. From component manufacturing, to touch-up paint jobs, and aircraft cleaning substances – small changes in our supply chain contribute to big improvements in local air quality.

“Across all our sites, a 60% reduction in VOC emissions has already been achieved.”

Together with Tarmac Aerosave, Airbus reuses or recycles up to 92% of its aircraft.

More than 700 industrial products have already been replaced by alternatives free of hazardous substances.

VOC emissions were reduced by 60% between 2006 and 2017 and its products optimised for reuse or recycling.

Innovative solutions helped Airbus reduce greenhouse gas emissions by 14% between 2006 and 2017.
CHAPTER 5

Taking production to new heights

Step onto one of our factory floors and you’ll find nothing like the noisy factories of the past. The latest technology, clean design and smart modules that allow operators and machines to interact – all of these aspects make our manufacturing processes safer and faster than ever before.
Everything from the infrastructure of our sites to day-to-day processes is being optimised to reduce greenhouse gas emissions. Improved ventilation systems, solar panels, pipes for geothermal heating, air-sourced heat pumps and biomass boilers all contribute to this. But invisible efforts, like low-energy lighting, improved insulation, voltage management and energy-efficient heating and cooling play an invaluable role in our manufacturing ecosystem.

Our data centre in Filton, UK, for example, has become one of the most advanced in the country with its revolutionary cooling system, using 80% less energy than with traditional cooling. And our headquarters in Toulouse, France, makes use of geothermal heat to regulate the indoor temperature in real time, saving 59,000 MWh of gas every year.

**Airbus’ final assembly line** in Alabama obtained LEED certification, a programme that rewards sustainability achievements in design, construction and operation.

**Airbus Helicopters’ engineering** building received BREEAM certification – the world’s leading sustainability assessment – in part for its 70% energy savings.

**The innovative use of geothermal energy** at Airbus headquarters in Toulouse saves 59,000 MWh of gas each year.

**Digitalisation inspires resource efficiency in Ottobrunn, Germany,** where the data centre’s passive heat exchanger doors use water instead of air to cool its server rooms.

**Transferring Airbus’** expertise in aeronautics to maritime transport, **AirSeas** is expected to enable ship owners to reduce fuel consumption and CO₂ emissions by 20%.
Within the next decade, our goal is to develop aircraft that fly with zero CO₂ emissions. This bold statement, made by our CEO Guillaume Faury in 2019, sounds somewhat utopian, but is also a testament to the innovations of tomorrow: developing electric propulsion will make aircraft more compatible with our environment.

Today, the mission to design a cleaner and more eco-efficient family of products is intrinsically linked to a comprehensive lifecycle approach. By continuously monitoring our products’ environmental impact, we are able to develop advanced materials and sustainable fuels while improving air traffic management and ground operations.
The primary structure of the A220, for example, is made of more than 50% advanced materials, found in the aluminium-lithium fuselage and in the titanium and composite components of the wings – among other places. Not only does it weigh less as a result, it also requires less maintenance. The A350 boasts similar figures for its components and saves up to 1.5 tonnes of weight through its composite parts. And by working closely with engine manufacturers, we are developing low-noise nacelle designs, acoustic treatment and low engine noise technologies. As a result, aircraft have already achieved a 75% decrease in noise compared with the 1960s.

The A350 civil aircraft is made of 53% lightweight, composite material.

The A220 family is the most efficient jetliner family in the skies in their class.

The A320neo family saves 20% in fuel burn compared with previous-generation aircraft.

The eco-friendly design of the Airbus Bluecopter Demonstrator reduces fuel consumption by 13%.

The first unmanned aircraft of its kind to fly in the stratosphere, Zephyr harnesses the sun’s rays, running exclusively on solar power.
Taking off with technology 2.0

Climbing to new heights, innovative new technologies like fuel cells are proving to have the capacity to power cabins and systems, while 3D printing can now deliver lighter parts and much less waste. Our Bionic Partition project, for example, used a 3D printed part for the A320, resulting in a 45% lighter product and reducing CO₂ emissions by 10 tonnes per year per aircraft.

In orbit, our 27 satellites are kitted out with direct or indirect applications for climate change monitoring, together boasting more than 200 years of in-orbit experience. Over 800 kilometres from Earth, satellites like Copernicus and STARLING monitor atmospheric chemistry, the ozone layer hole and sustainable forest management. They provide spatial imagery and help us keep tabs on environmental commitments made by countries and organisations.
Connecting people across the world by way of air travel enables a more prosperous world and rich cultural exchanges. To allow the next generations to keep flying in total respect of our planet, we have to continue to seek out the most innovative solutions as we have done in the last 50 years, and continue to live up to our principles as an international pioneer.

**ENERGY-EFFICIENT PRODUCTS**

The A350 saves 25% in fuel burn per seat compared with the aircraft it replaces.

Civil aerospace spends $15 billion per year on efficiency-related R&D.

In 2012, the A380 won an award from the Noise Abatement Society in London for its quietness.

To Airbus, “Shaping the future” means developing products and services with foreseeable environmental challenges in mind.