Product stewardship

Creating sustainable and safe products

When it comes to climate action in aviation, we firmly believe that we can bring about positive change. With this optimistic mindset, we continue our work on enabling passengers to fly safely and with a clear conscience in the future. We pursue a definitive technology roadmap to develop new products for the next few decades. Because we want to do more than just keep our finger on the pulse—we want to find solutions for a long and sustainable future.

Zero emissions from air travel

65% less aircraft noise

→ Product quality and flight safety
→ Climate & flying
→ Aircraft noise
→ Research and development
Ensuring high standards

Product quality and flight safety

Every year, millions of people board an aircraft equipped with our products and technologies. We aim to ensure that they land safely back on the ground. Safety first—for us, safe flight operation is way more than just a legal requirement. In aviation, it is fundamentally the highest priority. That’s why we place high demands on quality and safety in our processes along the entire value chain. Not least because reliable and high-quality products are our trademark.

Safety and quality are the top priority in aviation. We conduct our operations in accordance with uniformly high quality standards and safety regulations across the whole MTU Group.

Safety is imperative in aviation, and legal requirements concerning safety are subject to strict monitoring by the relevant authorities. This is why product quality and flight safety are just as important to us as well. The company must comply with the legal requirements imposed upon it as an organization that develops, manufactures and maintains products, parts and equipment for the aviation industry. These include aviation-authority licenses, approvals and certifications as well as safety and environmental requirements as legally mandated by regulatory authorities. Through stringent quality standards, we ensure that these are implemented across the Group and at all levels of the value chain in accordance with the law, thus adding value for our customers and partners. In addition, safe mobility solutions play a key role in the economy and society and represent an important global challenge for the future.
A **Group-wide integrated management system (IMS)** ensures compliance with laws and internal regulations and clearly assigns responsibilities within the company. One principle of the IMS policy is that “safety takes priority in what we do.” The quality framework is enshrined in a management manual that is binding for all employees and managers across the Group. The company’s dedicated quality department, Corporate Quality, is directly subordinate to the Chief Operating Officer (COO) and reports quarterly to the Executive Board on quality aspects and flight-related incidents. MTU Safety Management in accordance with the **International Civil Aviation Organization (ICAO)** standard is part of the IMS and defines how to handle safety-related air-traffic events. Appropriate organizational structures and responsibilities, such as a Flight Safety Board and a Flight Safety Manager, have also been established. High quality standards together with product safety and reliability are enshrined in the MTU Principles as key corporate objectives. Through independent, accredited external auditors, we regularly validate and certify our IMS.

**Sustainable product lifecycle**

We take into account all safety and environmental requirements of regulatory authorities in the early stages of planning new engines for later use, and compliance must be documented as part of the certification process. We employ a comprehensive testing program involving test rigs and test series to validate the safe flight operation of our products. This includes being able to ensure safe operation during a hailstorm or a bird strike (following a bird ingestion event) and complying with strict limits on pollutants and noise emissions. MTU components frequently exceed aviation authority requirements, because our customers demand high standards when it comes to fail-safe operation and eco-efficiency. In addition, our manufacturing and maintenance of engine parts and modules meets all required occupational safety and climate protection standards.

**Sustainability over the entire lifecycle of an engine**

1. **Development**
   - Clean Air Engine (Claire)
   - New technologies for improved sustainability and longer product service lives

2. **Production**
   - Environmental management (mostly compliant with EMAS and/or ISO 14001)
   - Production processes that conserve resources, such as additive manufacturing

3. **Service life**
   - MTU-developed Engine Trend Monitoring
   - MTU repairs, such as EROCAIT™ (patented erosion protection for compressor blades)

4. **Recycling**
   - Solutions tailored to older engines for disassembling and recycling components, such as SAVE™ and VALU™, for effective end-of-life management

*Engine materials such as titanium, nickel and alloying elements such as platinum or rhenium are of high value, and this explains why aircraft engines have very high recycling rates. As a vendor, we have no direct influence over the scrapping of engines, which is carried out by specialist companies.*
We examine our engine modules for their impact on the environment, health and safety throughout their development, production and operation lifecycles. Accordingly, we cover all major stages of a product’s service life. The key to our continuous progress is development. Our mission is to design every new engine we collaborate on so that it is greener, quieter and more fuel-efficient than its predecessor.

We use only fault-free and clearly identified components that have been approved by the appropriate aviation authority and are based on approved development documentation. They must also have been produced or maintained in compliance with aviation regulatory processes by a company officially authorized to do so.

In 2019, we didn’t again record a single breach of compliance with regard to the quality and safety of our products.

The aviation sector has strict rules governing documentation in order to verify the airworthiness of components and engines. There must be no gaps in documentation for the product’s entire service life. We hold our suppliers to the same standards and audit them regularly to ensure compliance. To ensure quality and safety requirements are upheld, we have implemented comprehensive monitoring and testing processes along the entire value chain. Safety-critical components (engine components are categorized into various safety classes) are subjected to particularly rigorous testing to verify their technical quality. Strict requirements also apply to materials. Since fail-safe materials are a basic prerequisite for aviation safety, all engine components, including all materials we use, must be approved by the aviation authorities after undergoing extensive test series.

In the previous financial year, once again there were no breaches of statutory regulations regarding compliance in connection with the purchase or operation of our products that resulted in a fine, sanction or warning for MTU.

Our quality standards are high

At MTU, we develop and refine our quality system together with our standards and regulations on an ongoing basis. This involves applying the ideas that emerge, for example, from collaboration in the Aero Engine Supplier Quality Group or from regular exchanges of experience and information among our quality managers in the aviation industry. In the reporting year, we improved our internal quality reporting system to better assess customer complaints, for instance.
We include all our employees in our high quality standards and provide key information across all locations through our Q.net quality network. In addition, several times a year we raise employees’ awareness of quality issues across the Group by providing them with relevant information (Q Info bulletins and lessons learned). We provide managers and employees with training on quality issues specific to the individual sites. Every employee receives IMS training.

Shopfloor/office management at all production and maintenance sites also supports continuous improvement: employees and managers exchange views on quality and other issues several times a week and initiate short-term measures if problems arise. We completed our Group-wide quality initiative for the commercial MRO segment at the end of 2019. With the initiative, we improved planning and maintenance processes throughout all MRO activities in accordance with best practice, or put ourselves on the right track making improvements.

We have customers and authorities conduct regular internal and external audits of quality issues to ensure that the uniformly high standards within the company are adhered to and that they comply with the regulatory requirements.

Customer satisfaction is at the core of all we do

A high level of product quality and safety is crucial for customer satisfaction. “High customer satisfaction” was a focus of our corporate objectives in 2019, with “quality at high levels” as a subordinate objective. IMS, our certified quality management system, supports us in ensuring customer satisfaction, process orientation and continuous improvement in all phases of development, production and maintenance. IMS takes into account, for example, the requirements of the standards ISO 9001, EN/AS9100, ISO 14001/EMAS and OHSAS 18001 (to be replaced by ISO 45001), and serves as a model approach in the aviation industry.

We set great store by customer complaints as an indicator of their satisfaction with the quality of MTU products. We follow up and analyze all customer complaints relating to products delivered in substandard quality. Appropriate measures are then defined and implemented so as to permanently eliminate the cause of the defects. In 2019 as in 2018, our goal was to lower or at least keep the number of customer complaints stable at all locations. We succeeded in doing this only at certain locations. At the majority, the number increased due to significantly higher production volumes and changes to the local product portfolio, for example, the new geared turbofan engine program or MRO parts repairs.

We are in dialogue with our customers

MTU Maintenance offers maintenance and additional services for aircraft engines and industrial gas turbines, and is thus active in the end-customer business. Direct interaction with customers, specifically airlines, leasing companies and energy producers, forms the basis of customer care. Once a quarter, we use an IT-based “voice of the customer” module to measure current customer satisfaction levels for our Hannover, Ludwigsfelde and Vancouver sites and for all main products. Each customer has the option of providing feedback about product quality, service, logistics and contractual terms. We use this valuable feedback to identify areas for improvement and initiate measures accordingly. Doing so allows us to continuously optimize our performance, increase customer satisfaction and stay competitive. In addition, MTU Maintenance Lease Services runs its own system for measuring satisfaction in the engine leasing and asset management business.
More information about:
Clean Air Engine agenda: Climate & flying and Aircraft noise
Climate protection in production
MTU maintenance technologies

Eco-efficient engines

Climate & flying

What moves us? What can we move? These are questions we have been asking ourselves since long before the current social debate on climate action. Moreover, we have been pursuing a roadmap for sustainable product development for years. This guides the hard work we are doing to minimize aircraft engines’ fuel consumption and CO₂ and pollutant emissions in several stages. Now we want to go one step further and are aiming for emissions-free flight.

We are driving climate action in air transport with our innovative and low-emission propulsion concepts. A prime example is the PW1100G-JM geared turbofan for the A320neo—pictured here making its maiden flight. The engine reduces CO₂ emissions by 16%.

Aviation is an important backbone of the economy. It ensures worldwide mobility, contributes to growth and prosperity and also connects people and cultures with each other. Today’s globally connected industries cannot function without it. However, flying has an impact on the environment and in particular on the climate and has recently seen strong growth rates. This is a major challenge that we are addressing as a responsible company: we are actively involved in shaping the change towards sustainable aviation with innovative, low-emission propulsion concepts. Our activities focus on climate action and the reduction of in-flight CO₂ emissions, with the ultimate goal of achieving fully emissions-free aviation. The only way we can do this is if the entire industry pulls together and policymakers implement the appropriate framework. For that reason, we are involved in numerous aviation initiatives.
Our contribution to the SDGs

Our sustainable product development contributes to the Sustainable Development Goals (SDGs) of the UN’s 2030 Agenda. We see our greatest impact as being in the areas of SDG 13 on “Climate action” and SDG 9 on “Industry, innovation and infrastructure.” In addition, our ecologically efficient engines support SDG 12 on “Sustainable consumption and production.” The SDGs are to be achieved by 2030, which is why UN Secretary-General Antonio Guterres has proclaimed the new decade the “Decade of action.” Our approach is longer-term, extending to 2050 and beyond, as aviation is characterized by very long development and operating cycles.

→ Learn more about our contribution to the SDGs

Pioneering: Our approach to climate action

We are working on solutions to make flying more environmentally friendly, with a focus on reducing fuel consumption and hence the CO\textsubscript{2} emissions of engines. Given our expertise in the development and manufacture of high-pressure compressors and low-pressure turbines, this is something we can directly influence. We are also conducting research into new propulsion concepts that will pave the way for aviation to become emissions-free. Sustainable product development with reduced fuel consumption is contained in the MTU Principles. We have also formulated guidelines on product development according to environmental criteria in our MTU Code of Conduct. Fuel consumption and CO\textsubscript{2} emissions are directly proportional and are a major factor in how aviation affects the climate. This is why improving fuel efficiency is very important to us, as it reduces both resource consumption and the impact on the climate. In addition, the use of alternative fuels, known as sustainable aviation fuels (SAFs), can significantly reduce CO\textsubscript{2} emissions both from the aircraft fleet already in service and from our new engines. This is why we are calling for the use of SAFs. They are absolutely essential for climate-friendly aviation.

Our vision: Emissions-free flight.

How do we intend to achieve this? We have drawn up our approaches in our “Technology roadmap toward emission free flying” which outlines a possible path to long-term emissions-free aviation. Only this way will we be able to help achieve the goal of limiting global warming to less than two degrees Celsius, as set out in the Paris Agreement.
We are committed to meeting the goal set out in the Paris Agreement of 2015 of limiting global warming to less than two degrees Celsius. This target far exceeds the goals defined by the European aviation industry and research sector’s Strategic Research and Innovation Agenda (SRIA) and extends beyond the worldwide targets set out by the International Air Transport Association (IATA). In our “Technology roadmap toward emission free flying,” we present a possible path to long-term emissions-free aviation. We are currently revising our Clean Air Engine agenda to redefine targets and ensure we help achieve the overarching Paris target.

We have a climate strategy and are pursuing a clear goal

Climate change is one of the greatest global challenges of our time. There is broad consensus in society on limiting climate change to a maximum temperature increase of two degrees Celsius by 2050 (Paris target). To achieve this, global emissions of greenhouse gases must be drastically reduced. According to the International Energy Agency, global air traffic is responsible for some 2.7% of CO₂ emissions around the world (data from 2015). MTU has made climate action a key focus of its sustainability strategy and pursues specific goals, particularly for products, as the vast majority of CO₂ emissions over an aircraft engine’s entire lifecycle occur in flight, in other words during the service life of our products. We actively support decarbonization, i.e. the shift to a long-term carbon-free economy, and include our own business activities in our climate action. → Learn more about this commitment under Climate protection in production.

The UN Intergovernmental Panel on Climate Change (IPCC) reports that the climate impact of air traffic is due mainly to CO₂ emissions, ozone production as a consequence of NOₓ (nitrogen oxide) emissions, and the formation of contrails and cirrus clouds. Since CO₂ emissions have the greatest effect on the climate, the greatest potential for us to have an impact lies in cutting down on this greenhouse gas by developing energy-efficient engines. New combustor concepts can significantly reduce NOₓ emissions. Since the combustor is not one of the components in our commercial aviation portfolio, we can make only an indirect contribution to avoiding nitrogen oxides by improving efficiency. Contrails and cirrus clouds also have an impact on the climate; they are generated under certain temperature and humidity conditions in the atmosphere triggered by particle and water emissions. Clever selection of flight routes and altitudes can greatly reduce contrails and cirrus clouds or even avoid them. Contrails can also be reduced with the help of sustainable fuels, as these produce fewer particulate emissions due to a lower proportion of aromatics. New propulsion concepts developed by MTU promise major reductions in the long term, both in terms of NOₓ emissions and in the formation of contrails.
The aviation industry is characterized by long product cycles, with aircraft engines as a rule spending 30 years in service before they are decommissioned. Goals to produce more eco-efficient engines must therefore have a long-term perspective and are established in memoranda of understanding by the aviation stakeholders (airlines, aviation industry, research, aviation authorities). In Europe, goals aimed at cutting fuel consumption and CO₂ emissions are defined in the SRIA since 2012. However, since these are not sufficient to meet the target set out in the Paris Agreement, we have undertaken to accelerate and broaden our activities in this regard. We believe that aviation must become emissions-free in the long term, which is why we are currently revising our Clean Air Engine agenda and the specific goals it pursues for the coming decades up to 2050—to make this a reality.

We have already achieved a great deal: The geared turbofan engine

With the first generation of the GTF Engine Family, which we are developing and manufacturing together with our partner Pratt & Whitney, we have not only achieved but in fact exceeded our first climate target of a 15% reduction in CO₂ emissions (16% for the PW1100G-JM that powers the A320neo, for example). Since 2016, this engine family has been successively introduced in various models for a total of five aircraft applications. With almost 10,000 orders and options, it has become a major business success and measurably reduces the burden on the environment: this first generation has already enabled airlines to avoid more than three million metric tons of CO₂ in flight. It also brings significant improvements in terms of airborne pollutants: the geared turbofan’s NOₓ emissions are 50% lower than those of its predecessor model.
Our Clean Air Engine agenda: Paving the way for emissions-free flight

Following the promising launch of the new geared turbofan engine, we now want to reduce fuel consumption and CO₂ emissions even further. To achieve this, we are taking an evolutionary approach based on the geared turbofan, which still offers huge potential for improvement. In the next generation, we want to develop its technology and turn it into an ultra-high bypass engine. Running the new engines on sustainable fuels (SAFs) will largely avoid CO₂ emissions altogether. Our engineers are already busy working on preliminary designs and technologies for the new generation. Within the German government’s LuFo aeronautics research program and European technology initiatives such as Clean Sky 2, we are driving development to get the engine ready for full-scale production; for example, we opened a new component test center at our headquarters in Munich in 2019 to test new materials and designs. This technology development work could be completed by 2027.

We advocate the use of sustainable aviation fuels

We believe they are indispensable in paving the way to climate-friendly aviation. The idea is to shift away from consuming fossil fuels and toward sustainable, renewable fuels. We are doing our part to ensure that this potential is harnessed for aviation.

As part of our Clean Air Engine agenda, we’re exploring different approaches to reducing fuel consumption and CO₂ emissions; our ultimate goal is to make aviation emissions-free. In our pursuit of this goal, we have completely new propulsion concepts on our agenda, which must surpass today’s technology by a long way. After all, these revolutionary engine architectures hold great potential and open the door to emissions-free flight. We are pursuing several promising concepts, which our experts are already working on together with universities: one is known as the composite cycle concept, in which an additional piston compressor and piston engine significantly increase air compression. In turn, this further reduces fuel consumption and CO₂ emissions. The advantage of this approach is that the design of the aircraft would not have to be changed to accommodate such an engine. However, it brings with it another great challenge: the high pressure and temperature ratios in the engine increase NOₓ emissions.

Another concept, the water-enhanced turbofan (WET engine), employs a heat exchanger to use the energy from the engine’s exhaust gas stream. It works by evaporating water in a heat exchanger and injecting the vapor into the combustor to generate additional power. A condenser is employed to obtain the requisite water from the exhaust gas. “Wet” combustion of this kind massively reduces nitrogen oxide emissions. This concept also cuts fuel consumption and CO₂ emissions by a large degree. In addition, it greatly limits the climate impact of contrails by largely eliminating emissions of water vapor. If this concept proves to be viable, there will be a further challenge to solve together with the aircraft manufacturer: how to integrate the required condenser into the aircraft.

In order to implement our plans, we signed a letter of intent for the EU’s Clean Sky follow-up program Horizon Europe at the Paris Air Show in June 2019. As one of 23 players involved in Horizon Europe—including companies, research institutions and universities—we want to work together to decarbonize aviation in the future.

At the same time as developing these revolutionary new heat engines, we are pushing ahead with the development of electric propulsion systems.
Battery-electric or hybrid-electric propulsion systems?
Both are conceivable

Battery-electric propulsion systems enable emissions-free aviation—provided the power is produced sustainably. As things stand, however, battery-electric engines are not technically feasible for existing commercial passenger aircraft. Today’s battery concepts do not come anywhere near the energy density of conventional kerosene. Batteries’ storage capacity is still far too small to power commercial flights. But battery-electric flight is a viable option for air taxis carrying a small number of passengers over short distances.

One possible concept for longer distances would be hybrid propulsion systems combining electric motors, generators, gas turbines and batteries. These open up completely new possibilities in aircraft design and propulsion technology while still using kerosene or SAFs as high energy density fuels for greater range. Disadvantages of hybrid propulsion systems, however, are the significant weight they add and energy conversion losses. We are participating in this future propulsion system through our stake in Silent Air Taxi, which was unveiled to the public in 2019 and is being developed in cooperation with RWTH Aachen University. It will have a parallel hybrid-electric propulsion system.

A true alternative: Sustainable fuels

Our position is clear: aviation must move away from the use of fossil fuels and tap far deeper into renewable energy sources. Because sustainable fuels have the potential to neutralize CO₂ emissions generated by aviation, they are an indispensable part of efforts to reach the target of the Paris Agreement.

Sustainable fuels can already be used in today's infrastructure, which is why MTU is advocating for their adoption. We do this, for instance, through our involvement in the Bauhaus Luftfahrt think tank and the Aviation Initiative for Renewable Energy in Germany (aireg), an association we set up together with airlines, manufacturers and research institutions.

The first synthetic fuels have already been approved for flight operations, having successfully met the stringent quality and safety requirements. The new fuels can be “dropped in” to existing infrastructure, which means there is no need to modify the engine or aircraft. Currently, only biomass-based fuels are available in larger quantities. However, the inputs for their production would otherwise be used for food and these fuels are much more expensive than conventional kerosene.

Experts believe that there is greater potential for non-biogenic processes, in other words for synfuels that are produced using renewable electricity or sunlight. There are two methods suitable for producing electricity- and sunlight-based fuels: power-to-liquid (PtL) and sun-to-liquid (StL). However, the production processes for this artificial kerosene are not yet available on an industrial scale, which means the fuels are still very expensive; at the moment, they cost many times as much as standard kerosene.
Power-to-liquid is a pioneering process for generating kerosene from water and CO₂

Does the future belong to the fuel cell?

One very promising propulsion concept is the hydrogen-powered fuel cell as an emerging technology for sustainable aviation. It emits nothing but water, paving the way for climate-neutral and pollutant-free flight. This concept uses hydrogen as its energy source and employs electric motors to drive the propulsors. Hydrogen has a very high energy density, so—in contrast to the electric battery—a fuel cell could conceivably also power long-distance flights. However, the fuel cells available today are not suitable for use in larger aircraft. Nevertheless, in light of their potential, we are pursuing this concept as a long-term solution as part of our Claire Technology Agenda.
You can find this film at https://youtu.be/8t0q_S-e2o0

GRI: 102-12, 103-2, 103-3, 201-2, 302-5, 305-3

UNGC: 7, 8, 9

Picture: www.airbus.com
Product stewardship

Eco-efficient engines

Aircraft noise

As part of our sustainable product development, we are not only working on reducing fuel consumption and the climate impact of air traffic. Our Clean Air Engine agenda also focuses on reducing aircraft noise and sets out clear targets to this end. Flying as a whole is set to become significantly quieter, too.

Powered by the geared turbofan from our Clean Air Engine agenda, the A320neo has reduced its noise footprint (propagation of aircraft noise in the airport area) by 75%. Further improvements are in the pipeline.

We are committed to active environmental protection and determined to reduce aircraft noise. This is important because quiet propulsion concepts can improve the situation for residents living near airports, thereby promoting society’s acceptance of air travel, especially in view of the increasing number of aircraft movements. As with our approach to climate action, we have established several pillars to anchor the issue of aircraft noise in the company. In our global Code of Conduct, we commit to climate protection and explicitly to reducing noise emissions from aircraft engines. We want to set standards in this area, and we have formulated our goal accordingly. The MTU Principles also include the requirement to create products with lower noise emissions under the heading “Environment and society.”
Our contribution to the SDGs

Our active commitment to reducing aircraft noise helps achieve two SDGs of the UN’s 2030 Agenda: SDG 9 on “Industry, innovation and infrastructure” and SDG 12 on “Responsible consumption and production.” Reducing aircraft noise levels improves the aviation infrastructure that is important for growth and prosperity while at the same time leading to lower levels of pollution for people living around airports.

In contrast to CO₂ emissions, to receive certification from aviation authorities both aircraft and engines must meet noise limits set by the International Civil Aviation Organization (ICAO); in the past, these limits have been successively tightened. Furthermore, at almost every airport in the world, the fees charged for takeoff and landing are dependent on the noise emissions of the aircraft model.

How is aircraft noise generated?

Aircraft noise is caused by both the engine and the aircraft itself. Noise during takeoff is largely down to the fan and engine airflow; during landing, the aircraft also adds to noise as a result of turbulence around the fuselage, wings and landing gear.

In the certification of new aircraft models, noise is measured using a standardized process at three defined points and then cumulated. Aircraft noise has decreased continuously since the 1960s, by a total of about 17 EPNdB (effective perceived noise decibels) or about 70%.
Quieter flying: Our Clean Air Engine agenda provides answers in this area, too

With our Clean Air Engine agenda (Claire), we are pursuing not only climate action targets → Climate & flying, but also targets for reducing aircraft noise emissions. Our project is in line with the European aviation industry and research sector's Strategic Research and Innovation Agenda (SRIA), which calls for noise reductions of 55% by 2035 and 65% by 2050. With the first-generation geared turbofan, we have already significantly reduced aircraft noise emissions as part of Claire Stage 1. They are on average 15–20 EPNdB (cumulated over the three ICAO measuring points) below the current legally stipulated noise emission class, ICAO Stage 4. This equates to a reduction in the geared turbofan's noise footprint (spread of aircraft noise near airports) of 75%.

65% less aircraft noise

With our Clean Air Engine agenda, we have not only set ourselves targets for protecting the climate. We also want to gradually reduce aircraft noise—by up to 65% by 2050.

In the next step, Claire Stage 2, improvements to the second-generation geared turbofan are set to reduce aircraft and engine noise emissions by 50% (base year 2000). To achieve this, the engine industry has developed the necessary fans with a low pressure ratio and low-noise low-pressure turbines as part of European research programs such as ENOVAL.
SRIA and Claire agenda targets for reducing noise emissions

All the targets refer to an aircraft’s noise emissions including engines (improvements are relative to an aircraft from the year 2000); noise level in EPNdB (effective perceived noise decibels) are relative to the limits defined by the International Civil Aviation Organization (ICAO) (Stage 4). A reduction in noise emissions of 10 EPNdB corresponds to a 50% cut in perceived noise.

In the third and final stage of Claire, noise emissions are set to be reduced by as much as 65% (base year 2000) thanks to new engine architectures such as integrated and distributed engines. Our engineers are currently working on various promising concepts for the future, and our acoustics experts are involved in our projects at every stage of product development, from technology management to subsequent engine design and optimization.

GRI: 102-12, 103-2, 103-3

UNGC: 7,8,9

Picture: www.airbus.com
Sustainable innovations

**Research and development**

We are a technology leader in aviation—and it is our extensive research work and a high level of innovation that keep us in this top position. With our comprehensive research and development activities, we want to implement innovative and sustainable solutions that strengthen our competitiveness and secure our business. Ultimately, all MTU’s stakeholders benefit from this—above all our customers, employees and shareholders.

We bring together smart minds and a whole host of experts who are working on the solutions of tomorrow. Our engineers are also focusing their attention on emissions-free flight.

We are committed to the principle of integrated environmental protection, which takes a precautionary approach to how the company’s products impact the environment and integrates insights from this into entrepreneurial decisions. This applies above all to our research and development work. In the technology and innovation process, our experts investigate environmental and societal driving forces for aviation and take them into account when defining MTU concepts and targets. We receive input for our analyses and stakeholder expectations through various channels as part of our stakeholder dialogue, which we conduct on an ongoing basis with all stakeholders.

→ More information about Stakeholder dialogue
Our contribution to the SDGs

Our sustainable product solutions for aviation generate added value for our customers and for society. In this way, we support several of the United Nations’ Sustainable Development Goals (SDGs): SDG 9 on “Industry, innovation and infrastructure,” SDG 12 on “Responsible consumption and production,” SDG 13 on “Climate action,” and SDG 17 on “Partnerships for the goals.” A secondary objective of SDG 9 calls for research and development to be expanded by 2030. We conduct intensive research and development work with numerous specialists in the company and in collaboration with universities and research institutions.

→ Learn more about our contribution to the SDGs

An Innovation Board regularly discusses all topics related to technology and innovation and initiates technology projects and studies. The Technology steering committee, of which the Chief Operating and Chief Program Officers are also members, approves MTU’s technology roadmap (*Climate action and Aircraft noise*) and receives regular updates on progress and the course of the projects. MTU manages its product development in a multistage technology and innovation process. Short-term product development is oriented toward concrete customer specifications on the basis of existing technologies. In the medium term (up to 15 years), we will create advanced product designs and derive technology requirements from them. And over the long term (up to 2050), our engineers will use a technology radar to develop pilot concepts and initiate the development of enabling technologies. The basis of this technology process is our culture of innovation, which we cultivate with a variety of initiatives. These include a Group-wide innovation management concept, the Inno Lab and Ideation Challenges through which we gather and evaluate ideas from employees related to a specific field of innovation.
“In the Inno Lab, we put ideas on the fast track,” says Dr. Carsten Subel, Head of the Inno Lab at MTU, on the global search for technology trends and the significance of a company culture that lets innovation thrive. Read the interview here

We stepped up our investment in clean technologies in the reporting year: in 2019, we invested EUR 214.3 million (2018: EUR 201.2 million) in research and development. R&D as a proportion of revenue was 4.6% (2018: 4.4%). A large portion of research and development spending goes toward improving the environmental sustainability of aircraft engines (lower fuel consumption, weight reduction, lower CO₂ emissions, noise reduction). MTU employs almost 1,300 engineering specialists around the world. Our teams bring together bright minds from fields as diverse as acoustics, fuel cells, 3D printing and bionics.

Our intellectual property management system ensures that we protect our extensive technological expertise

A large portion of our research and development spending, which amounts to EUR 214.3 million, goes toward improving our environmental sustainability of aircraft engines. We currently have around 150 technology projects in the research pipeline.
We have an extensive network

To sustain MTU’s technological expertise, it is important to be adequately plugged into the research landscape. We maintain a network of some 100 universities, research institutions, and companies around the world. MTU is involved in all major national and European research programs that push the development of ecologically efficient engine technologies for aviation. These programs bring together researchers from a wide range of manufacturers and universities.

We have access to a strong network of universities, research institutions and companies and participate in important aviation research programs.

In addition, we cooperate directly with numerous universities and research institutions and maintain several centers of competence at selected German universities, which are devoted to specific research topics. There is more information about this in the chapter on Corporate social responsibility.

GRI: 102-12, 102-43, 103-2, 103-3

UNGC: 7, 8, 9