



2016 Sustainability Report

MTU Aero Engines AG





Table of contents

Foreword by the Chief Executive Officer	5
About this report	6
MTU Aero Engines AG	8
1 Sustainable governance	10
1.1 Sustainability strategy and organization	12
1.2 Ethics and integrity	18
1.3 Compliance and human rights	20
1.4 Sustained value creation	24
2 Responsibility for products and supply chain	28
2.1 Management approach: product responsibility	30
2.2 Innovations	31
2.3 Fuel efficiency	35
2.4 Climate strategy	36
2.5 Flight noise	40
2.6 Product quality and safety	42
2.7 Responsibility for the supply chain	46
3 Environmental protection	50
3.1 Management approach: environmental protection	52
3.2 Energy management	55
3.3 Emissions	57
3.4 Water	60
3.5 Material efficiency and waste	63
4 Employees and Society	66
4.1 Management approach: employment	68
4.2 Occupational health and safety	72
4.3 Attractiveness as an employer	74
4.4 Employee development	77
4.5 Diversity and equal opportunities	80
4.6 Corporate Social Responsibility	84
Goals and goal attainment for 2016	88
GRI-Index	94

Masthead

Publisher
MTU Aero Engines AG
Eckhard Zanger
Senior Vice President Corporate
Communications and Public Affairs

Project management and contact point
for questions regarding content
Ute Schwing
Senior Manager
Corporate Online Services, Internal
Communications and CR
corporateresponsibility@mtu.de
www.mtu.de

Photo credits

Cover	Airbus
Pages 2-3	Airbus
Pages 4-5	MTU Aero Engines
Pages 8-9	Jetblue, Airbus, Boeing, IAE, MTU Aero Engines
Pages 16-23	Airbus
Page 24	Boeing
Pages 25-28	MTU Aero Engines
Page 29	Airbus
Pages 30-33	MTU Aero Engines
Page 34	Airbus, Bombardier, Mitsubishi
Page 37	MTU Aero Engines
Page 41	Airbus
Pages 42-83	MTU Aero Engines
Page 85	Bauhaus Luftfahrt
Page 85	MTU Aero Engines

Geared Turbofan™ is a registered trademark of
Pratt & Whitney.



OG LAPF
7538-01

STA 308.59
CG

PW1100G
XT98633-02
CONDI NOZZLE
SN 01
WEIGHT 125 LBS

Foreword by the Chief Executive Officer

Dear readers,

We are living in a changing world. Urbanization and digitalization are shaping our lives and we are becoming increasingly mobile and interconnected. At the same time, climate change and resource scarcity are shifting the very foundations on which we base our actions. MTU is already engaging with these ongoing developments. As a signatory to the UN Global Compact, we are committed to continuously improving the way in which we implement its key principles of protecting the environment, respecting human rights, ensuring fair working conditions, and preventing corruption.



MTU's commitment to sustainability is directly reflected in the way we do business. We generate sustainable value with a long-term perspective, striving for environmental and social improvements throughout the entire value chain. In recent years, we have been providing detailed updates on these topics in our sustainability reporting. This is the fifth edition of our sustainability report and, for the first time, it presents our goals and activities for all the fully consolidated sites of the MTU Group worldwide.

We manage our business with a strong sense of responsibility for society and the environment coupled with the determination to make a key contribution

to rising to the challenges of the 21st century. Product responsibility lies at the heart of our sustainability strategy because it is the area where we can exert the most influence. The Geared Turbofan™ engines we launched together with our partners in 2016 offer significant reductions in CO₂ emissions and aircraft noise. Powered by Geared Turbofan™ engines, the A320neo is now flown by the airlines, and the second model in this engine family also entered regular commercial service in 2016. Overall, more than 8,000 orders were placed for the Geared Turbofan™ engine by the end of 2016. We are continuing to work on additional milestones as part of our Clean Air Engine agenda. We plan to cut CO₂ emissions by up to 40 percent and reduce noise levels by up to 65 percent by 2050. Sustainability is a crucial part of our ability to meet future challenges—and that's why we are resolutely pursuing the development of eco-efficient engines.

We continuously strive to reduce the environmental impact of our production processes and make sensible use of natural resources. Sustainability is also our guiding principle across other areas of our value chain. Our working relationships with our suppliers are based on binding social and environmental standards to ensure our joint activities are underpinned by clear criteria.

To us, sustainability also means applying fair business practices within our company. MTU offers an attractive working environment for a diverse workforce comprising outstandingly skilled professionals and managers. In this context, training and developing our employees is particularly important to us, because they are one of the key pillars of our success. This applies equally at all MTU's locations. As well as continuously developing our company's leadership culture, we also take full account of the increasing importance of digitalization in the world of work.

We hope that this report will provide insights into our sustainability initiatives at all MTU's locations, highlighting what we have already achieved and what we plan to accomplish down the line. We intend to continue working across national boundaries to help advance eco-friendly mobility in the future.

We hope you will join us on this journey!

Yours sincerely,

A handwritten signature in blue ink that reads "Reiner Winkler".

Reiner Winkler
Chief Executive Officer
MTU Aero Engines AG

About this report

MTU Aero Engines AG Sustainability Report 2016

MTU Aero Engines AG has compiled this sustainability report to inform its stakeholders about corporate responsibility (CR) within the company. The report provides information about the company's CR strategy, objectives and performance and describes the priorities for the various CR spheres of activity in 2016 and the progress made in them. It continues where the previous report for 2015 left off and is available for download on our website as a PDF in both German and English.

- MTU Sustainability Report (German)
- MTU Sustainability Report (English)

Questions about the report can be addressed to corporateresponsibility@mtu.de.

Reporting in accordance with GRI

The Sustainability Report 2016 was drawn up in compliance with the Global Reporting Initiative (GRI) guidelines and meets the GRI G4 standard ("Core" option). Accordingly, we report on all required standard disclosures as well as on management approaches for key aspects and on selected indicators for each aspect (to facilitate comparison, tables and diagrams are cross-referenced with the corresponding indicator). The GRI Index at the end of the report indicates how the contents are mapped to the GRI requirements. A materiality matrix (in Chapter 1, Sustainable governance, p. 13) presents the sustainability topics that are relevant for MTU and shows how they are weighted from an internal and external perspective. It serves as the basis for selecting the key aspects and performance indicators for this report.

UN Global Compact— Communication on Progress

This sustainability report incorporates the Communication on Progress according to the ten principles of the UN Global Compact, a measure designed to facilitate stakeholder access to CR-relevant information. Cross-references to the UN Global Compact's ten principles can be found in the GRI Index at the end of the report.

Reporting period and scope of validity

The reporting period corresponds to the 2016 calendar year (January 1 to December 31), which is also the 2016 financial year for MTU Aero Engines AG. To better organize how information is presented and provide explanatory context for readers, activities from outside the reporting period are also cited in some cases. The report covers all of the MTU Group sites that are treated as fully consolidated in the company's financial reporting. This includes:

- MTU Aero Engines AG, Munich, Germany
- MTU Maintenance Hannover, Germany
- MTU Maintenance Berlin-Brandenburg, Ludwigsfelde, Germany
- MTU Aero Engines Polska, Rzeszów, Poland
- MTU Maintenance Lease Services B.V., Amsterdam, Netherlands
- MTU Maintenance Canada, Vancouver, Canada
- MTU Aero Engines North America, Rocky Hill, U.S.
- Vericor Power Systems, Alpharetta, U.S.

The 2016 information and key performance indicators in the report refer to the above group reporting entity; any deviations from this are indicated. Prior-year figures comprise the European locations Munich, Hannover, Ludwigsfelde and Rzeszów (as indicated), since the integration of all fully consolidated sites into CR management was completed in 2016. There were no significant year-on-year changes in the company's supply chains in 2016.

Key performance indicators (KPIs)

All data and information for the reporting period was collected by the relevant departments using representative methods. Environmental KPIs are collected via the environmental management systems at the individual sites and then consolidated centrally in the CR database according to agreed criteria. The HR KPIs are collected and evaluated centrally at the headquarters in Munich for Germany, and using an electronic HR management system for all non-German sites. Once the data is evaluated, it is sent to the CR database. All other data is requested from the CR center coordinators in the relevant departments and compiled centrally in the CR database. Financial KPIs are collected and published in accordance with the International Financial Reporting Standards (IFRS).

External validation of the report

The CR reporting for this sustainability report is not subject to external auditing or validation. The majority of corporate processes that underlie data collection for CR reporting are certified.

- MTU's certifications

Further information

You can find supplementary information, more detailed analyses and older publications online:

- Corporate responsibility at MTU
- Compliance at MTU
- MTU annual reports

In addition, we regularly report on important sustainability topics in central MTU publications and through various communication channels.

Forward-looking statements

This report contains forward-looking statements. These statements reflect the current understanding, expectations and assumptions of MTU Aero Engines and are based on the information available to management at the present time. Forward-looking statements provide no guarantee that certain results and developments will actually occur in the future, and they entail risk and uncertainty. Consequently, for a variety of reasons, the actual future results of MTU Aero Engines may deviate substantially from the expectations and assumptions expressed here. MTU Aero Engines assumes no obligation to update the statements contained in this report.

The next sustainability report is expected to be published in summer 2018, and a non-financial statement pursuant to the German CSR Guidelines Implementation Act prior to that, in April 2018.

MTU Aero Engines AG



In the aviation industry, three simple letters stand for top-notch engine technology: MTU. With a workforce of about 9,000 people (including Asia) Germany's leading engine manufacturer has been providing propulsion systems to power aircraft for more than 80 years now, having become an established global player. The company engages in the development, manufacture, marketing and support of commercial and military aircraft engines and industrial gas turbines.

MTU Aero Engines in figures

1934 launched in Munich

approx. **9,000** employees (including Asia)

14 company locations around the world

4.7 billion euros in sales in fiscal year 2016

As part of its commercial activities, MTU Aero Engines designs, develops and manufactures engine modules and components. Its technological expertise in the field of low-pressure turbines, high-pressure compressors and turbine center frames as well as manufacturing processes and repair techniques have made MTU a leading manufacturer of subsystems and components in the global engine business.

The engine programs of MTU that currently yield the highest sales

V2500 for the A320 family of aircraft

GP7000 for the A380

GEnx for Boeing 787 and 747-8

PW2000 and

CF6-80 for medium- and long-haul aircraft

Commercial engine business

With its products, MTU has content on engines in all thrust and power categories, from powerplants for small business jets to the world's most powerful jetliners. The company is a risk-and-revenue-sharing partner in the major commercial engine programs. Under the partnership arrangements, MTU assumes full development and production responsibility for the components and modules forming part of its work share. Its cooperation partners are the world's big-league players in the engine industry—Pratt & Whitney, GE Aviation, and Rolls-Royce.

MTU program work shares depending on the valuation of the module
up to 20 %

To gird for the future, MTU has taken stakes in a number of significant engine programs and is well positioned in the marketplace. Among these future programs are the GP7000 for the Airbus A380 megaliner, the GEnx engine to power the Boeing 787 Dreamliner and Boeing 747-8 long-range widebody airliner and the GE9X for Boeing's 777X. The advanced geared turbofan™ technology is applied in Pratt & Whitney's PurePower® engine family. To date, five major aircraft manufacturers have selected the PW1000G models to power their latest aircraft. Airbus is offering the PW1100G-JM for the A320neo. Bombardier has chosen the propulsion system as the sole engine choice for its C Series, as has Mitsubishi for its MRJ regional jet. Irkut will equip its MS-21 with the engine. Last, but not least, Embraer has opted for the PW1000G family as the exclusive powerplant for its second-generation E-Jets. To date, over 80 airlines worldwide have ordered more than 8,000 geared turbofan engines.

In the military arena, the company is the German Armed Forces' major industrial partner for practically all engine types flown by them. MTU provides a full range of services, from maturing enabling technologies through developing and manufacturing engines and engine components, to providing maintenance and comprehensive customer support services.

Commercial engine maintenance

MTU Maintenance, a division of MTU Aero Engines, is one of the top five providers of maintenance services for aircraft engines and industrial gas turbines. With more than 30 engine types, it boasts one of the largest portfolios worldwide, including the bestsellers V2500 and CFM56, and the world's largest engine, the GE90-110/-115B. New engine programs are continuously added to offer customers the most popular variants and to secure the company's position in the aftermarket for next generation engines.

MTU Maintenance in figures

4,000 employees (approx.)

over **17,000** Shop Visits

35 years of company history

Apart from its outstanding technical and engineering know-how, customer proximity is one of MTU's greatest strengths. A network of locations in Europe, Asia and North America as well as representative offices, IGT service centers and joint ventures around the globe ensure that its customers' expectations are fulfilled timely and with the same high standard of quality. These include dedicated centers of excellence, e.g. for parts and accessory repairs. In addition, on-site teams are able to carry out repair jobs at every corner of the world at short notice.

The Munich headquarters

Munich is home to MTU Aero Engines' corporate headquarters. This is from where the group's subsidiaries and most of its research and development activities are controlled and where military and commercial engine components are produced in various shops. With its stake in Pratt & Whitney's geared turbofan engines, MTU's production volumes are growing rapidly: Whereas the company manufactured around 600 blisks a year so far—for various engine programs—the total number produced will exceed 5,000 blisks annually from 2020 on. To cover the demand for titanium compressor blisks, MTU has built a blisk center of excellence that boasts a high degree of automation and an intelligent control and logistics system. The shop on the company's premises in Munich accommodates the most advanced production system of its kind worldwide.

The Munich site in figures

500,000 square meters

4,700 employees (approx.)





1 Sustainable governance

We manage MTU's business in a responsible and forward-looking manner. Sustainability is already enshrined in our company as an overriding principle, and we intend to implement it even more vigorously in our processes in the future. Continuous improvement is our goal in every aspect of our CR activities. Long-term value creation provides the basis for achieving this.



Main GRI aspects covered by this chapter:

- | | |
|--|--|
| ■ Identified material aspects and boundaries | ■ Non-discrimination |
| ■ Stakeholder engagement | ■ Freedom of association and collective bargaining |
| ■ Ethics and integrity | ■ Child labour |
| ■ Anti-corruption | ■ Forced or compulsory labor |
| ■ Public policy | ■ Assessment |
| ■ Anti-competitive behavior | ■ Human rights grievance mechanisms |
| ■ Compliance | ■ Economic performance |

1.1 Sustainability strategy and organization

MTU has always demonstrated a sense of responsibility in everything it does. To us, sustainability means making environmental and social aspects part and parcel of our business activities. It means combining long-term business success with social and environmental responsibility while also taking into account our stakeholders' interests. We have incorporated this responsibility in our annual corporate objectives by declaring that "sustainability drives our actions."

Climate change, mobility and scarce resources are global challenges that affect society, politics and the economy—and they are also driving forces behind our business. We create products and innovations that contribute to the sustainable development of society and the environment. They support our end customers, the airlines, in improving energy efficiency and reducing emissions and aircraft noise.

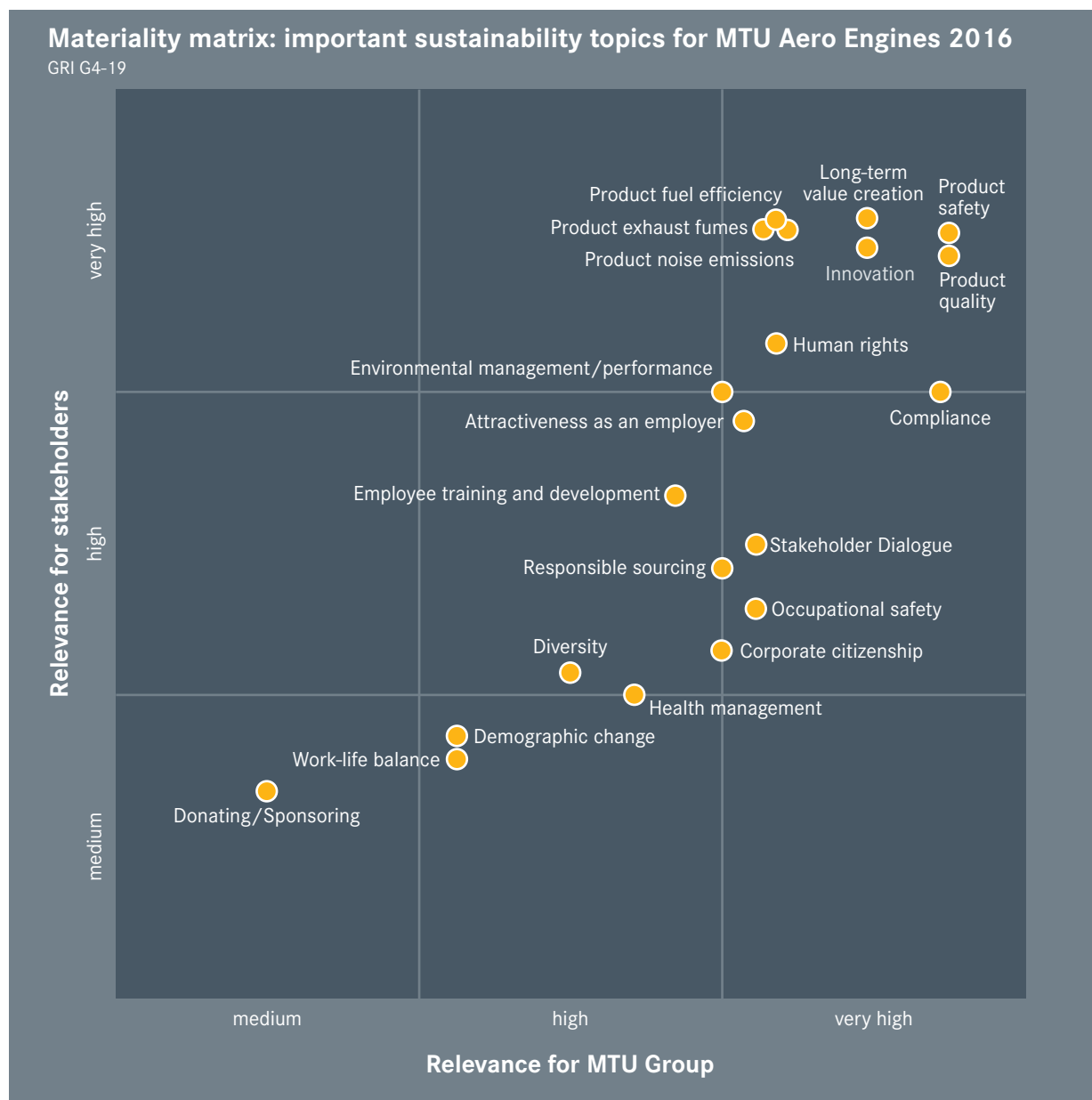
Our sustainability strategy covers every area of MTU's business. It is based on the principle of materiality, which means that we give a weighting to each topic to reflect its importance to MTU and our stakeholders. Our strategy takes into account upstream added value and downstream use of our products (> Materiality principle, GRI G4-20, 21 in annex). We put product responsibility at the heart of our sustainability strategy because it represents the largest contribution we can make to sustainable development.

Materiality analysis (GRI G4-18)

We focus on key topics that have an impact on the success of MTU's business, on society, and on the environment. We identified these topics using a materiality analysis and we regularly reassess them as part of our annual review. Toward the end of 2016, the CR coordinators reviewed and assessed the topics in an internal workshop. For the first time, we extended our sustainability strategy to all the fully consolidated locations of the MTU Group, adding our international subsidiaries in the US, Canada and the Netherlands. Two evaluations were carried out prior to the workshop, one examining sustainability topics from an international perspective to determine their current relevance, and the other focusing on top management appraisals from across the group. The results were then incorporated in our materiality matrix.

The materiality analysis covers all our key business areas and locations as well as the experience and insights gathered from our dialog with stakeholders. Having identified the relevant topics, we insert them in a matrix. This materiality matrix gives a weighting to the topics according to their importance from an in-house perspective and from the point of view of our most important stakeholders. We identify our stakeholders' needs and expectations by conducting a dialog with them and running a survey dedicated to CR topics. The survey questionnaire is available year-round on the MTU website and is also sent directly to stakeholders.

This year's updated matrix gives a slightly stronger weighting to aircraft noise in the category of product eco-efficiency. This reflects the important role of noise emissions both for stakeholders—in this case people who live in close proximity to airports—and for MTU based on statutory regulations. The inclusion of our North American locations has widened our focus to the entire MTU Group. This has produced a shift in the topics of diversity and attractiveness as an employer because diversity has more relevance for stakeholders in North America than we previously considered it to have for our European locations. It is also subject to stricter regulations in the U.S., for example. Attractiveness as an employer has taken on an even higher priority within the materiality matrix, reflecting the critical importance of competing successfully with other regional employers at our locations in Poland and Canada and at U.S.-based AENA. Occupational safety has taken on increasing importance for the entire MTU Group. We consider it to be very important because providing safe workplaces is one of the fundamental responsibilities we have as an employer.



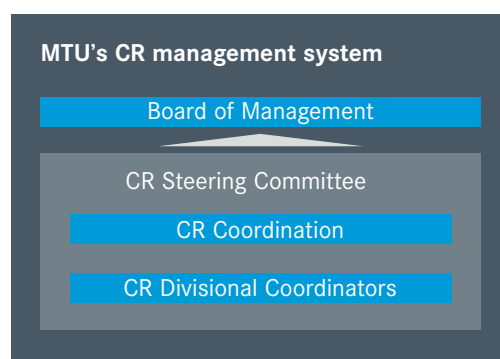
Our materiality analysis also covers topics that will be relevant in the future and that offer opportunities or risks for our business. The 2016 reviews did not add any new topics to MTU's sustainability agenda. Asked to identify topics that would be important to the industry in the future, our stakeholders cited topics that MTU has already taken into account in its current strategy. The increasing digitalization of society

and business is gaining momentum and has a clear impact on MTU. We have risen to this challenge and will step up our efforts to address it over the next few years. Digitalization does not change MTU's business model, so we have chosen to take an evolutionary approach while also evaluating this topic for our sustainability strategy.

CR-Management

We have integrated our responsibility to conduct our business in a sustainable manner within the organization. We use a CR management system to manage our sustainability strategy, performance and goals. The CR steering committee is an MTU-wide body whose members are drawn from the tier-1 senior management team. The steering committee reports once a year to the Executive Board, which decides on the next steps in the sustainability strategy. As the highest decision-making body, the Executive Board is responsible for sustainability at MTU. A central CR coordination team coordinates the implementation of the sustainability strategy and oversees communication with stakeholders and reporting on CR topics.

The CR divisional coordinators in the various business areas play an important role. They develop goals and measures in their areas, implement them, and take responsibility for monitoring goal achievement. In collaboration with managers and experts in their technical areas, the coordinators play a key role in shaping the strategic focus of the CR goals specific to their area and developing these goals over time. In this reporting year, we have expanded CR management to cover all the fully consolidated MTU sites (MTU Maintenance Lease Services, Amsterdam, the Netherlands, MTU Aero Engines North America, Rocky Hill, U.S., Vericor Power Systems, Alpharetta, U.S., MTU Maintenance Canada, Vancouver, Canada).



Using an integrated database, the CR coordinators deliver an annual report to the central CR coordination team covering validated key performance indicators, information on the company's commitment to sustainability, and progress achieved so far. In addition, the CR bodies meet regularly over the course of the year to exchange information, coordinate measures and approve goals.

To increase employee awareness of sustainability and embed it within our internal processes, we have started running CR training sessions for

selected areas of our business. The first courses to be held were a training program for purchasers in fall 2016 and a training session for employees at our headquarters in Munich. Training courses on sustainability management and data collection for the sustainability report were run for the newly added locations in fall 2016.

In 2017, we will be holding a special one-day sustainability event at our headquarters in Munich which we hope will increase people's knowledge of sustainability, raise awareness, and promote sustainable behavior.










Dialog with stakeholders (GRI G424-27)

We strive to conduct a proactive and mutually supportive dialog with our stakeholders about sustainability topics. This dialog gives us the opportunity to respond to suggestions, expectations and feedback and act on new topics and challenges in a timely manner. Stakeholders are individuals, groups or organizations that have a reciprocal relationship with MTU. Our key stakeholders are employees, customers, business partners, suppliers and shareholders. We maintain regular contact with scientists and researchers, analysts, journalists, politicians, industry associations, employee representatives, neighbors and local government authorities.

One of the key tools MTU uses to determine what people need and expect from our company in regard to relevant CR topics is the stakeholder survey on our website

(<http://survey.mtu.de/corporate-responsibility>). This tool enables us to open up our sustainability strategy for discussion and appraisal. We made improvements to the 2016 survey to gain even better insights into the relevant topics and to obtain even more frank and honest feedback. The appraisals and opinions given by survey respondents are incorporated in the materiality analysis in an annual stakeholder workshop. We also use target group-specific communication channels and forms of dialog to get stakeholders involved and gather feedback (> Stakeholder dialog diagram). We intend to expand our dialog with stakeholders in the future.

We pick up and act on topics that come to our attention through the CR stakeholder survey or other communication platforms. Our stakeholders' interests are primarily concerned with eco-efficient engines, product responsibility, compliance, MTU as an attractive employer, and the regional responsibility of MTU's sites. No new topics emerged from our dialog with stakeholders in 2016.

Stakeholder dialog			GRI G4-24, 26
Stakeholder	Topics	Forms of dialog	
Employees 	<ul style="list-style-type: none"> • Health and safety • Career and advanced training opportunities • Compensation and Benefits • Work-Life-Balance • Diversity & Equality of opportunities • Co-determination 	<ul style="list-style-type: none"> • Internal media • Employee surveys • HR services • Dialog and information events • Company suggestion scheme 	
Business partners and customers 	<ul style="list-style-type: none"> • Product quality and safety • Sustainable technologies • Product fuel efficiency • Human Rights • Compliance 	<ul style="list-style-type: none"> • Voice of the Customer • Trade fairs • Corporate communications media channels 	
Suppliers 	<ul style="list-style-type: none"> • Product quality and safety • Sustainable technologies • Product fuel efficiency • Human Rights • Compliance 	<ul style="list-style-type: none"> • Voice of the customer • Trade fairs • Corporate communications media channels 	
Capital market 	<ul style="list-style-type: none"> • Product innovation/eco-efficiency • Responsible corporate governance • Human rights • Compliance • Environmental protection • Risk management • Supplier management 	<ul style="list-style-type: none"> • Annual General Meeting • Conferences and roadshows • Investor discussions • Trade fairs • Ratings • Financial communications 	
Science and research 	<ul style="list-style-type: none"> • Developing new technologies • Promoting research and teaching • Networking between industry and research • Study of engineering and scientific disciplines • Recruiting 	<ul style="list-style-type: none"> • Joint research projects • Work in MTU centers of excellence • Trade fairs • Visits from university student groups • Presentations/discussions at universities 	
Media 	<ul style="list-style-type: none"> • Innovation and technologies • Aviation sector/eco-efficiency • MTU as employer • Financial • Site development • Compliance 	<ul style="list-style-type: none"> • Press releases • Press conferences and briefings • Plant tours • Internet/Social Media • Trade fairs 	
Region 	<ul style="list-style-type: none"> • Social commitment • Environmental protection • MTU as employer • Site development • Compliance 	<ul style="list-style-type: none"> • Museum open house days • Community partnerships • Internet/Social media • Plant tours 	
Politics, public agencies 	<ul style="list-style-type: none"> • Developing and promoting technology • Environmental protection, eco-efficiency • Political frameworks and regulations • Mobility concepts • Site development • Demographic change • Globalization • Compliance 	<ul style="list-style-type: none"> • Parliamentary evening • Plant visits • Trade fairs • Political discussions • Background talks • Visits by political delegations 	
Associations and organizations 	<ul style="list-style-type: none"> • Eco-efficiency • Promoting innovation and technology • Economic and labor policies 	<ul style="list-style-type: none"> • Meetings and committees • Participation in forums and events 	

Political dialog (GRI G4-SO6)

The aviation sector and aero engine industry are strongly impacted by political decisions at national, European and international levels—more so than many other sectors. Key points of contact for the company include elected representatives and decision-makers from ministries at state, federal and EU levels as well as from subordinate authorities and the German Armed Forces. To ensure transparency and adherence to external and internal regulations, MTU manages its political dialog centrally through the Group Representation Office of the Corporate Communications department.

Topics of discussion include innovation, technology development and funding, environmental protection and noise reduction, the relevance of air traffic to society, site development, economic and labor market policy, and support for exports. MTU pursues its industry-specific interests through memberships of various industry associations (> see memberships in GRI content index in annex).

All activities are carried out in compliance with the applicable legal and regulatory requirements and with MTU's Code of Conduct. As a matter of principle, MTU maintains a neutral stance in its political dialog by not favoring or promoting any particular political party or faction. MTU does not make any financial donations to political parties. Any lobbying activities by MTU employees are carried out in compliance with the applicable legal requirements. The German Federal Government Directive Concerning the Prevention of Corruption in the Federal Administration of July 30, 2004 (Federal Gazette no. 148) must be respected at all times. Further mandatory requirements are stipulated in the regulations set out in MTU's compliance management system—especially those relating to donations, sponsorship, customer events, in-house events, hospitality and corporate gifts—and in MTU's Code of Conduct. Compliance with these rules and regulations is the responsibility of the relevant manager in each case and is safeguarded by an internal control system.

Risk management

MTU has established a group-wide integrated risk management and control system based on the leading international COSO II ERM Framework standard. We describe all the risks and opportunities facing MTU in our annual report (2016 risk and opportunity report included in the annual report, pp. 113-125). Each quarter, a checklist is used to identify risks throughout the group at all our business units and at all our sites. The results are then compiled in a central database. A total of 15 risk categories cover all the different areas of our business. The central risk management department aggregates and consolidates the risks reported by the business units. A cross-divisional Risk Management Board acting at group level submits a quarterly report to the Executive Board and Supervisory Board detailing MTU's current risk situation.

Sustainability aspects are integrated in this internal control system, and the risk identification process also includes questions on non-financial risks. At present, MTU has not identified any significant non-financial risks that could hinder the evolution of the company's business or have a negative impact on the environment or society.



The stakeholder dialog gives us the opportunity to gather suggestions, expectations and feedback.

Overview of potential sustainability risks		
Topic	Risk	Measures
Product	Restrictive environmental protection policies that limit air traffic	<ul style="list-style-type: none"> • We regularly analyze the risks and opportunities of climate change (e.g. workshops run by the German Aviation Association (BDL), studies conducted by Bauhaus Luftfahrt). • Multi-level technology process that incorporates driving forces for aviation (climate change, scarcity of resources) • We hold regular discussions with stakeholders about environmental topics (noise, airborne pollutants)
Product	Hazards and risks that arise from a product during its life cycle	<ul style="list-style-type: none"> • Proof of safe flight operation as per requirements stemming from approval by aviation authorities • Project to implement REACH regulation to address hazardous substances
Compliance	Non-compliance with laws and internal guidelines	<ul style="list-style-type: none"> • Code of Conduct for all employees • Group-wide Compliance Board • Compliance audits • Regular anti-corruption and compliance training
Environmental protection	Non-compliance with laws and internal guidelines	<ul style="list-style-type: none"> • Code of Conduct for employees including commitment to protect the environment • Certified environmental management system with annual audits • Project to implement REACH regulation
Employment	Failure to respect human rights	<ul style="list-style-type: none"> • Code of Conduct for all employees including protection of human rights • Regular training on Code of Conduct • MTU Principles
Supply chain	Non-compliance with social and environmental standards	<ul style="list-style-type: none"> • Code of Conduct for Suppliers including commitment to protect human rights and the environment • Checking for conflict minerals • Requirement to implement REACH regulation

1.2 Ethics and integrity

Ethical principles form the basis of our work and business relationships and are binding for all employees, managers and Executive Board members.

We firmly believe in the importance of safeguarding human rights, observing labor laws, maintaining fair working conditions and business relationships, enforcing high health and safety standards in the workplace, refraining from corruption, and ensuring employees have proper training and qualifications. Managers have a particular responsibility to uphold these standards and act as role models in regard to compliance with applicable laws, regulations and internal guidelines.

Code of Conduct

Our Code of Conduct ensures sustainable and responsible conduct throughout the MTU Group, both within the company and in its dealings with the outside world. The Code addresses the following basic principles:

- Integrity
- Conflicts of interest and insider trading
- Responsibility in industrial relations
- Environmental protection
- Fair business practices

These principles apply to all employees throughout the company. New employees receive information on the Code of Conduct when they start work at MTU. They are required to sign a statement confirming that they have understood its key principles and agree to abide by them. We also present and discuss the Code of Conduct during the induction event for new employees at all our locations. Furthermore, we run regular

training sessions on the Code of Conduct for selected business units as part of our compliance management process. In 2016, we organized 383 days of training on legal issues for 1,656 participations in Germany.

MTU does not tolerate any kind of conduct that violates laws or regulations. Any detected violations will be punished. If stakeholders suspect any improper conduct, they can contact an ombudsman confidentially (ombudsmann@mtu.de). As in previous years, no violations of the Code of Conduct were reported by employees or external stakeholders in the reporting period.

These internal measures are supplemented by the Code of Conduct for Suppliers—we apply the same standards to our supply chain.

One of the main purposes of our Codes of Conduct for Employees and Suppliers is to ensure the observance of human rights throughout the entire value chain. They can be downloaded from the MTU website.

- Code of Conduct for Employees
<http://www.mtu.de/company/compliance/code-of-conduct/>
- Code of Conduct for Suppliers
<http://www.mtu.de/company/compliance/code-of-conduct-for-suppliers/>



Corporate governance

As the executive body of MTU, the Executive Board acts under its own discretion to pursue the goal of creating sustainable added value in the company's interests while taking into account the interests of its stakeholders. In consultation with the Supervisory Board, the Executive Board decides on the company's strategic direction, sees that this is implemented, and ensures that the company has appropriate risk management and control systems in place. It delivers regular and timely reports to the Supervisory Board on current opportunities and risks and how they are evolving.

The Executive Board is also responsible for ensuring compliance with statutory requirements and the company's own guidelines. In Germany, where the company has its headquarters, the rules for responsible corporate governance are set out principally in the German Stock Corporation Act (AktG), the Codetermination Act (MitbG), and the German Corporate Governance Code. MTU complies with all the recommendations of the German Federal Ministry of Justice's Corporate Governance Code in the version of May 5, 2015 (> Statement of compliance, 2016 annual report, p. 32). In accordance with the recommendations provided in the German Corporate Governance Code, we have aligned Executive Board remuneration with the long-term success of the business.

MTU Principles

"We shape the future of aviation" is the title of the MTU Principles. As an integral part of our corporate culture, they help MTU to act in a consistent and reliable manner by defining the company's future orientation and its basic goals and values. They are based on five pillars:

- Products, technology and growth
- Cooperation and conduct
- Employees and management
- Partners, customers and shareholders
- Environment and society

MTU has formulated principles for each of these pillars that express the associated values and guidelines. The MTU Principles apply to all employees worldwide and are regularly updated to reflect new developments and challenges.

International standards

MTU bases the implementation of its CR program on internationally recognized conventions such as the UN Global Compact, which it joined in 2011. As a member, we are committed to observing the ten principles relating to environmental protection, respect for human rights and fair labor practices, and the fight against corruption. MTU's Code of Conduct forms the basis for implementing these standards in our value chain.

We are guided by the following internationally recognized conventions:

- UN Global Compact
- United Nations' Universal Declaration of Human Rights
- The principles set out in the International Labor Organization's (ILO) core labor standards
- German Corporate Governance Code



1.3 Compliance and human rights

The long-term success of any business is founded on compliance with applicable laws and regulations and the company's own internal guidelines. We expect all our employees, partners and suppliers to conduct themselves in a lawful manner at all times. In addition, we are firmly committed to respecting human rights.

The company acts as a fair employer, business partner and customer, and advocates transparent competition where all parties are on an equal footing. Integrity and responsible conduct are core values of our corporate culture and are embedded in our Code of Conduct, which is binding for all employees from the boardroom to the shop floor. Compliance strengthens the trust our stakeholders place in our company and bolsters MTU's good international reputation. As a signatory to the UN Global Compact, we are committed to protecting human rights and preventing corruption within our company.

MTU condemns corruption of any kind as well as all other forms of white-collar crime. It conducts its business within applicable legal frameworks, paying particular attention to competition, anti-trust and trade law and data protection legislation.



Reiner Winkler
Chief Executive Officer
of MTU Aero Engines AG

"We consider compliance with rules to be a matter of course. We do not tolerate any infringement of laws or of the company's internal guidelines, as MTU deems credibility and trust to be indispensable values. A transparent approach and fair business practices are the foundation for stable, long-term stakeholder relationships."

Export compliance

All transactions that involve the purchase or sale of engine components from or by our suppliers and customers in the OEM segment are verified in our system before processing (sanction screening in the SAP Global Trade Services (GTS) application). Our military customers include the

defense ministries of countries whose armed forces deploy aircraft powered by our engines, and companies that work under contract to these ministries. For every product that we deliver to a military customer, we require an export license issued by the relevant national authorities. MTU does not deliver or export military engines or components of such engines without this official authorization.

Compliance organization

An enterprise-wide framework of compliance rules ensures adherence to our Code of Conduct and statutory requirements. As the final decision-making authority, the CEO is responsible for the company's business ethics and anti-corruption policy. One of the key tools for ensuring the ethical conduct of business activities is the Compliance Board. Created several years ago, this central body exercises its responsibilities throughout the MTU Group. Its members are the heads of the Legal Affairs, Corporate Audit and Corporate Security departments. The Compliance Board holds both regular and ad hoc meetings and provides quarterly updates on its activities to the Executive Board and the Supervisory Board's Audit Committee. MTU has also appointed special group-level officers to deal with issues such as data protection, environmental protection, and IT security.

We have instituted a confidential global whistleblower system that allows employees and external stakeholders to report suspected cases of corruption or illegal activities or violations of the Code of Conduct to an ombudsman. The ombudsman can be contacted by email from anywhere in the world (ombudsmann@mtu.de), or a personal meeting can be arranged.

The possible ways of reporting non-compliance are communicated to employees through internal media channels and explained to external stakeholders in writing or on our website. The identity of the whistleblower and the information he or she imparts are treated as strictly confidential—even if the suspicion turns out to be unfounded. It goes without saying that whistleblowers acting in good faith shall not be penalized or disadvan-

tagged by the company in any way. In addition, employees can confide in their superiors, the legal department, and their appointed security representative. Any violations that are proven shall be duly punished. MTU applies a principle of zero tolerance in matters of compliance and accepts no excuses for infringements of the law or of the company's internal guidelines.

Compliance and anti-corruption training

(GRI G4-SO4)

Our goal is to prevent any possible forms of misconduct. One of the main jobs of the Compliance Board is therefore to take preventive action by raising employees' awareness. It does this first and foremost by organizing compliance and anti-corruption training courses for all employees and special seminars for managers and employees who hold positions of trust. These courses are repeated at regular intervals. During the reporting period, we ran compliance and anti-corruption training courses for 329 employees from selected business units in Germany and Poland. Attendance is compulsory. Employees and members of the Executive Board can also seek personal advice from the Compliance Board to clarify matters well before any non-compliance occurs.

We are guided by international compliance standards such as those set by the Institute of Public Auditors in Germany (IDW Auditing Standards) and the guidelines issued by the Organization for Economic Cooperation and Development OECD (Good Practice Guidance on Internal Controls, Ethics, and Compliance). We are regularly assessed by Transparency International, a non-governmental organization dedicated to fighting corruption. In its last assessment, MTU was placed in band B, which means that Transparency International considers the company to have provided good evidence of an anti-corruption and ethics program.

Business partners and compliance

(GRI G4-SO3)

To ensure sound and reliable business relationships, the Compliance Board inspects consulting contracts for possible corruption risks before they are placed or renewed. The potential consultants are reviewed by TRACE International, an independent provider of due diligence services. Contract placement or renewal must be approved by the CEO. Such approval is granted only if the Compliance Board has issued a positive recommendation. In 2016, we submitted all consulting contracts due to be placed or renewed to the Compliance Board and TRACE for inspection. No corruption risks were identified in this process. Compliance management along the supply chain is based on responsible sourcing.

Membership in anti-corruption initiatives

- Aerospace and Defense Industries Association of Europe
- UN Global Compact
- TRACE International



A company-wide framework of compliance rules ensures adherence to our internal Code of Conduct and statutory requirements.



Compliance risks and assessments

(GRI G4-SO3/5, SO7/8)

Compliance risks arise when managers or employees of the company fail to comply with laws and regulations or fail to observe internal guidelines. These risks may occur in any area of the company, and they include the risk of corruption. The appointed officers at group level are responsible for ensuring that specific legal requirements are complied with and that appropriate and uniform standards are established on a company-wide basis. The Corporate Audit department conducts regular compliance audits in which it checks business processes and procedures for conformity to legal requirements and adherence to internal guidelines. We regularly assess corruption risks as part of our corporate risk management process and review our framework of compliance rules. Moreover, MTU is regularly evaluated by Transparency International.

No violations of MTU's Code of Conduct were identified in the reporting period and, as in previous years, there were no indications of any suspected cases of corruption. Moreover, the company incurred no significant financial penalties resulting from violations of applicable laws and faced no legal action due to anti-competitive, cartel or monopoly practices.

Human rights

MTU respects the internationally proclaimed human rights set out in the United Nations' Universal Declaration of Human Rights and enforces and protects these rights within the company and in its sphere of influence.

MTU is committed to respecting the individuality and dignity of all, maintaining equality of opportunity in recruitment and selection, and preventing discrimination. The company promotes employment diversity and the integration of employees with disabilities. As the employer of approximately 9,000 employees worldwide (including Asia), we create fair working conditions based on legally binding employment contracts with appropriate remuneration. This includes the right to unionize and to adopt collective agreements.

Protecting human rights is firmly embedded in MTU's business. It is enshrined in the Code of Conduct for employees as a principle of corporate social responsibility. Our commitment to respecting human rights is reinforced by our status as a signatory to the UN Global Compact. In the materiality matrix, human rights are high

on the agenda for both the company and its stakeholders. We apply the issue of human rights to our company's employment practices. We also expect our business partners to uphold human rights as a basis for long-term cooperation.

MTU consolidates high standards of social responsibility in the supply chain by making use of responsible sourcing. A key instrument is the commitment our suppliers make to MTU to protect human rights in their own sphere of responsibility and to not be complicit in human rights abuses. This is enshrined in all MTU procurement contracts as a matter of course (Code of Conduct for Suppliers).

Respect for human rights

(GRI G4-HR3-6, HR9/12)

MTU considers the risk of human rights violations occurring in its business activities to be low at all its locations because these activities are governed by national legislation that upholds human rights. No complaints of human rights infringements were made via internal reporting channels in the MTU Group during the reporting period. There were also no indications of any infringements at MTU's suppliers. MTU has taken specific steps to boost transparency in the supply chain to prevent conflict minerals from being included in MTU products. There were also no indications that any business activity could pose a risk of compulsory or forced labor during the reporting period, and no cases of discrimination were reported.

Employee training is a key preventive measure, especially training for focus groups on the MTU Code of Conduct.

1.4 Sustained value creation

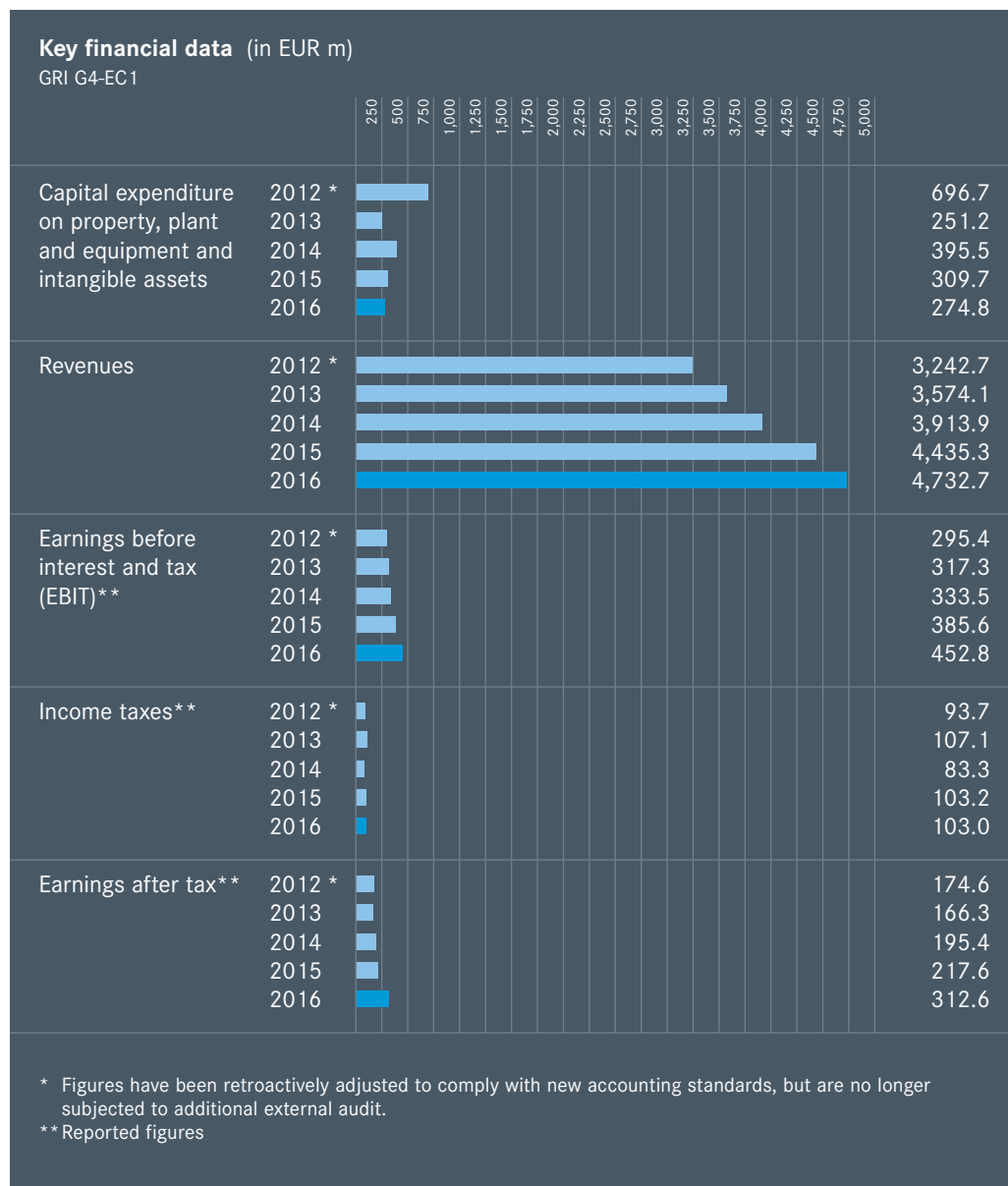
As a listed company, it is our duty to steadily increase the value of our business. By pursuing a business strategy that supports profitable growth, we can be confident of maintaining strong earnings, remaining competitive, and securing our financial assets well into the future.

MTU aims to increase shareholder value over the long term. Our overriding goal is to achieve profitable growth across all business units. To this end, we pursue a long-term strategy designed to consolidate and expand the company's market position in each of the sectors in which we operate. The resources that underpin this strategy are a future-oriented product portfolio, stable and long-established customer relationships, skilled and motivated employees, and a global presence in growth markets. We implement this strategy based on a three-pronged approach that involves building on our already excellent technological position, acquiring stakes in new engine programs with potential for growth, and improving our competitiveness by promoting a culture of continuous improvement. This, in turn, makes MTU an indispensable partner to OEMs that develop, manufacture and maintain their engines in international cooperative networks.

Long-term value creation has an overriding importance for us as a prerequisite for many other areas. The company's commercial success not only has positive effects on MTU in its role as an engine manufacturer and cooperation partner, but also as an employer, customer, local investor and sponsor. In the eyes of shareholders, this makes MTU's stocks an attractive capital investment with increasing dividends. The local communities in which MTU's locations are based benefit from attractive jobs and a commitment to social responsibility, for instance in the domain of science and education, where MTU participates in research projects that help to strengthen ties between universities and industry. MTU is an important employer for local communities at all its major international locations.



Participation in new programs with high growth potential, such as the propulsion system for the Boeing 777X widebody aircraft, is a key pillar of MTU's strategy.



The key indicators of MTU's economic performance reveal a clear upward trend over the past five years. Business has steadily improved from year to year, with the company achieving record results once again in fiscal 2016. Adjusted earnings before interest and tax reached a new high of 503.0 million euros, 14 percent up on the previous year (2015: 440.3 million euros). Adjusted earnings after tax exceeded the previous record by 13 percent, climbing to 345.4 million euros. The company's order backlog grew by 13 percent in 2016 to reach 14.2 billion euros (2015: 12.5

billion euros), forming a solid basis for MTU's continued growth. MTU expects the 2017 figure for adjusted earnings before interest and tax to be higher than the previous year.

Shareholders continue to participate in the company's success, with MTU paying a dividend of 1.90 euros in 2016, an increase of 12 percent over the previous year. In total, MTU paid out 97.6 million euros to its shareholders, reaffirming the continuity and consistency of its dividend policy.

We are continuously adding more value. The net value added created by MTU has remained at a consistently high level over the years. In 2016, it increased significantly to reach 1,098.1 million euros. At 60.5 percent, the biggest share of this amount was once again distributed to employees in the form of wages, salaries and other benefits. Payments to lenders and other creditors accounted for 1.7 percent, and the proportion utilized to pay taxes levied by public authorities fell slightly to 9.4 percent. The amount reserved to pay a dividend to shareholders was 8.9 percent, slightly higher than the previous year. The remaining value added of 215 million euros was retained by the company to provide adequate financial resources and facilitate forward-looking investment as a basis for profitable growth. These figures show that MTU remains very much on a successful trajectory.

Sustainable investment

MTU's performance is also regularly assessed by capital-market analysts and independent experts with regard to non-financial indicators. MTU is listed in the following sustainability indexes and rankings:

- STOXX ESG Leadership 2016/2017
- oekom Prime-Status
- CDP
- Vigeo Eiris

MTU's inclusion in these indexes is further proof of our excellent performance in the fields of environmental protection, corporate social responsibility, and corporate governance.

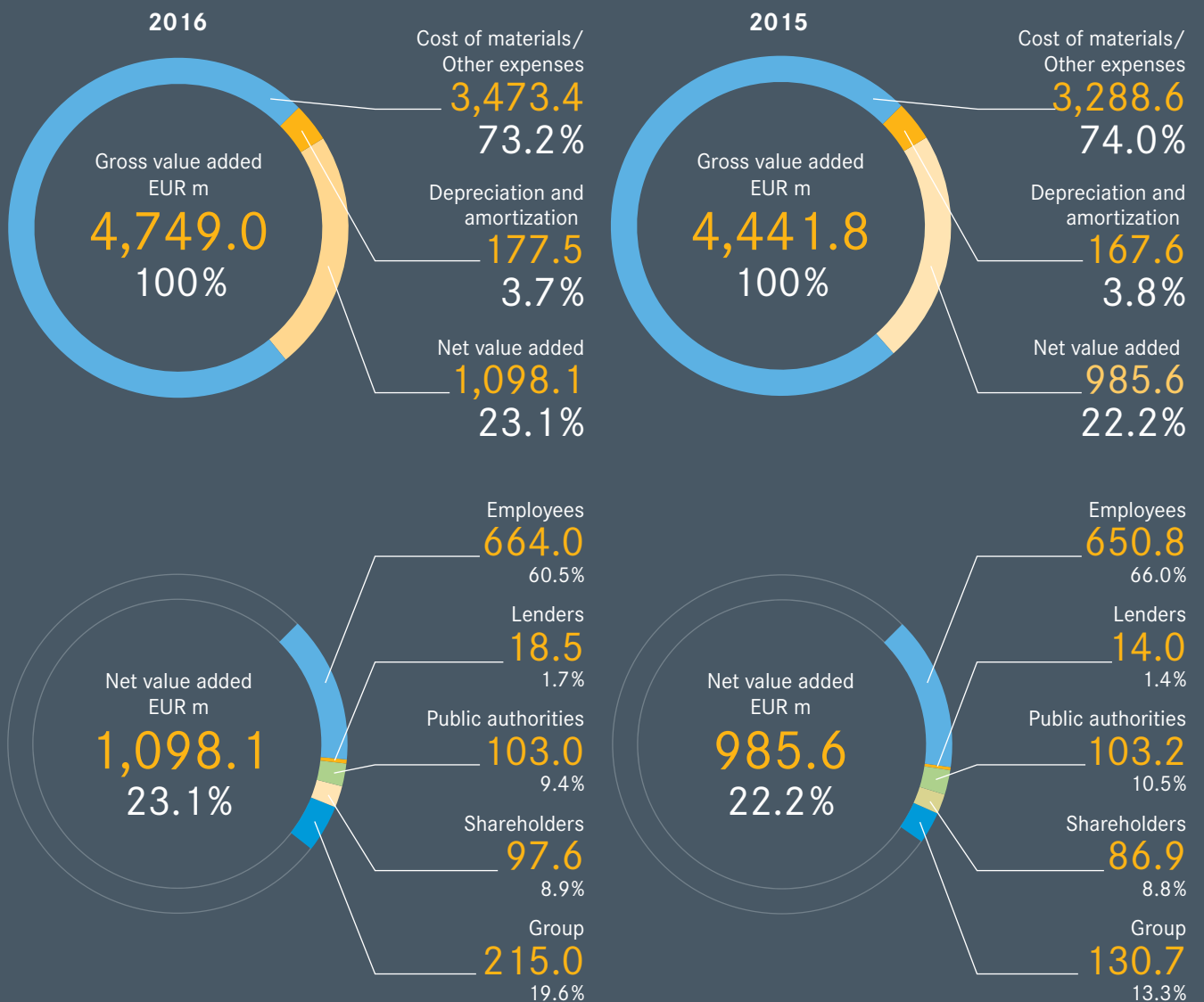
In 2016, we also presented our sustainability management at an investor conference for the first time.



MTU's Center of Competence for titanium compressor blisks in Munich is the most advanced production facility of its kind worldwide.

Comparison of value added, 2016 and 2015

GRI G4-EC1





2 Responsibility for products and for the supply chain

Resource protection, climate change, sustainable mobility concepts and complex supply chains are challenges we are facing up to as an aviation company. MTU places very high importance on the eco-efficiency, safety and quality of our products. In the interests of sustainable value creation, we take responsibility for products and for the supply chain.



Main aspects covered by this chapter:

- Customer health and safety
- Product and service labeling
- Compliance
- Products and services
- Supplier environmental assessment
- Supplier assessment for labor practices
- Supplier human rights assessment
- Organizational profile (supply chain)

2.1 Management approach: product responsibility

We are a premium aviation provider in the field of developing, manufacturing and maintaining engine modules and complete engines. Our product portfolio covers all thrust classes, from engines for business jets to engines for widebody aircraft. MTU has a share in several engine programs by various original equipment manufacturers (OEMs). Partners and customers value MTU for the sustainability, quality, reliability, safety and efficiency of its products.

We pursue product responsibility over the entire lifecycle of an engine, from development all the way through to the recycling of engines and components. Most of the effects our products will have on safety and the environment are determined at the development stage. Using a materiality analysis, we defined the chief aspects of product responsibility for our sustainability strategy (see Chapter 1.1 Sustainability Strategy). They are as follows:

- Product quality
- Product safety
- Fuel efficiency of products
- Exhaust emissions of products
- Noise emissions of products
- Innovations

These areas are of very high priority both for MTU and for its stakeholders. Consequently, the strategic focus of our corporate responsibility (CR) is on product responsibility. All aspects of product responsibility are relevant within MTU as well as in downstream value creation (materiality principle, G4-20-21).

All product-related sustainability topics are enshrined in our organization: eco-efficiency (which includes the topics of fuel efficiency, exhaust emissions and noise emissions) is contained in the MTU Principles under the maxim of sustainable product development with reduced fuel consumption and noise and pollutant emissions. We also set down our high quality expectations there. As innovations are strategically important to MTU as a recognized technology leader, they have been incorporated in MTU's corporate strategy and corporate objectives. Safety plays a critical role in aviation. Accordingly, safety and quality are key principles in MTU's IMS (integrated management system) policy. IMS is a group-wide, certified set of quality regulations. All of the

MTU Group's production sites are certified to the ISO 9001 quality standard.

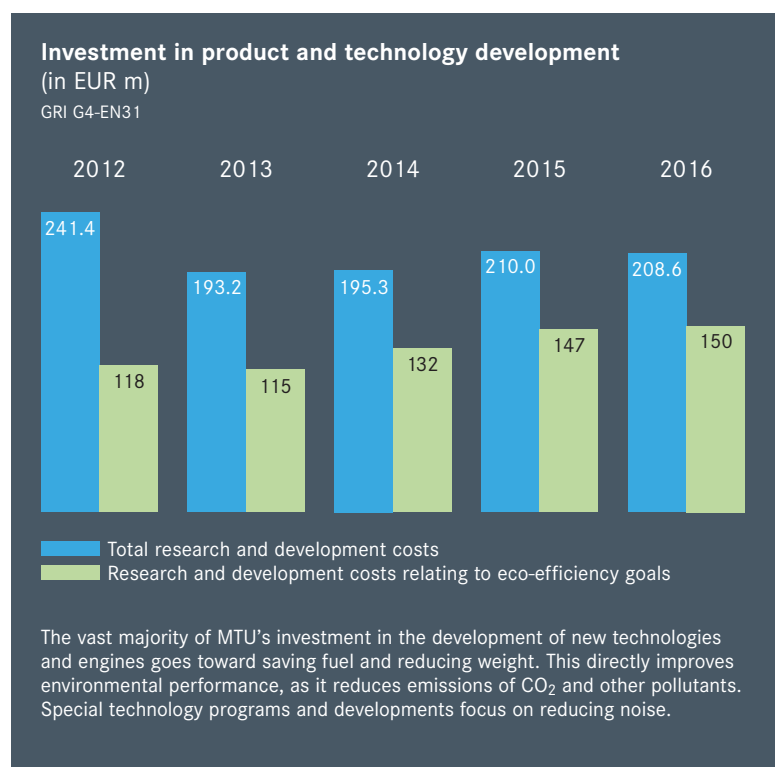
MTU wants to make aviation as environmentally friendly as possible. Helping to achieve this goal is the company's Clean Air Engine (Claire) agenda, whose objectives are implemented in stages and which we launched in 2008. We successfully completed the first stage in 2016 and are already working hard on the second stage. Through Clean Air Engine, we are implementing targets for higher energy efficiency and lower CO₂ emissions and flight noise by 2050. At the same time, the agenda acts as a long-term technology roadmap for our innovation management. The foundation for this is the new Geared Turbofan™ engine concept, which MTU co-developed.

Via a management system used throughout the MTU Group, we ensure the quality and safe operation of our products across their entire lifecycle. This is based on statutory regulations and aviation industry standards, which MTU strictly observes at every stage of value creation.

2.2 Innovations

MTU is a major technology leader in the aviation industry, and innovations are an integral part of our strategy. We undertake product and process innovations internally and together with partners, science and research. As a driver of innovation, we offer our customers and partners decisive competitive advantages.

The aviation industry is characterized by long product cycles and a high degree of innovation, and MTU is no exception: innovation and research are cornerstones of the company and part of our strategy. As one of three main pillars, leading technology helps the company achieve profitable growth. Moreover, further expanding MTU's leading technological position is a continuous corporate goal. The focus is on further developing the Geared Turbofan™ to create the second generation of this groundbreaking technology, with the goal of achieving ten percent reductions in fuel consumption and CO₂ emissions. MTU's most innovative engine program, the Geared Turbofan™, is also the most important in terms of order backlog (more than 8,000 orders and options by the end of 2016) and is developing into a driver of growth in new business. Another corporate goal is the greater use of simulation techniques in development and manufacturing. In this reporting year, MTU launched the group-wide MTU 4.0 initiative in order to identify and utilize further potential of digitalization for engine manufacturing.



Dr. Rainer Martens
Chief Operating Officer
at MTU Aero Engines AG

"Innovations are enormously important for MTU. Having top-ranking products helps our customers remain competitive. We use our innovative capacity to design tomorrow's mobility solutions. Ambitious goals and a comprehensive development process will help us meet the future challenges facing the aviation industry."

We have implemented a defined company-wide technology process to develop innovative products and methods. The needs of current and planned engine programs determine the short- to medium-term technology developments, while all long-term technology developments are grouped together in the Clean Air Engine agenda and positioned before product developments.

In 2016, 208.6 million euros (2015: 210 million euros) were spent on research and development. For years, R&D as a proportion of revenues has been at a constant level, and was 4.4 percent in 2016 (2015: 4.7 percent). A large portion of research and development costs goes toward improving environmental sustainability, and expenditure for this purpose amounted to some 150 million euros in 2016.

We are currently running 140 technology projects, which we methodically align with our corporate objectives. In 2016 alone, 20 projects reached the status of technological maturity in the areas of development and manufacturing. Our system of intellectual property management ensures that we protect our technological expertise; we file more than 400 patents each year. At the end of 2016, MTU's patent portfolio encompassed 3,101 property rights, primarily in the technology areas of manufacturing, compressors and turbines. Approximately 1,000 employees work in engineering worldwide. In the form of MTU Aero Engines North America, the company operates an engineering site in Connecticut, USA, which has some 150 employees. In addition, MTU maintains a central department for technology development, which works hand in hand with product development.

To sustain MTU's technological expertise, it is important to be adequately plugged into the research landscape. The company is involved in all major national and European research programs. This includes the European Commission's largest ever aviation research program, Clean Sky (<http://www.cleansky.eu/>), in which MTU plays a major role. Clean Sky will be completed in 2017; its successor, Clean Sky 2, was launched in 2015 and will run until 2020. Clean Sky aims to validate new technologies to establish their application readiness.

MTU is responsible for SAGE 4 (Sustainable And Green Engines 4), one of five Clean Sky engine demonstrators, which it tested on its test rig in Munich in 2016. 500 test cycles and 30 starts confirmed the technological maturity of new weight-saving designs and materials under higher loads as well as of advanced aerodynamic designs. New simulation techniques and measurement methods were also validated. The innovations further increase the eco-efficiency of the next Geared Turbofan™ generation.

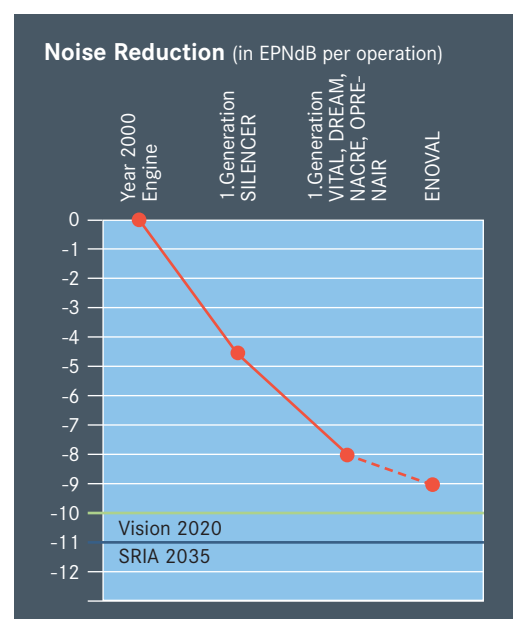
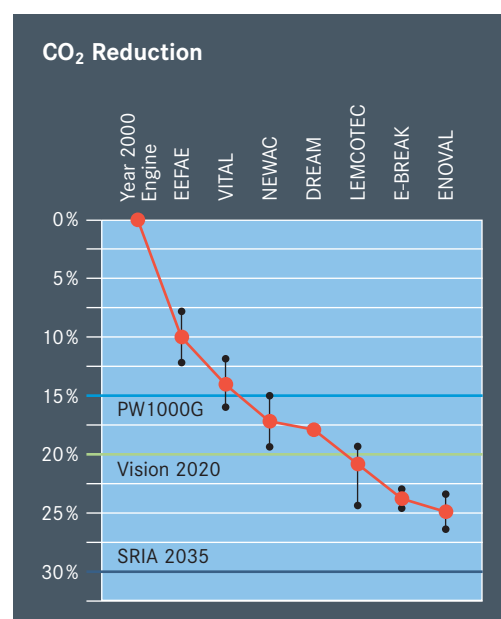
Further EU research programs in which MTU was involved in 2016 (selection):

- ENOVAL
- Lemcotec
- E-Break (finished in 2016)

www.enoval.eu
www.lemcotec.eu
www.e-break.eu

In addition, MTU cooperates with 17 universities and research institutions in Germany and maintains centers of excellence devoted to specific priority research topics at seven selected universities (see 4.6 Corporate Social Responsibility).

CO₂ and noise reduction goals of technology programs in which MTU is involved





Innovation portfolio at MTU

The strength of our innovation is mirrored in our often groundbreaking new developments, such as the Geared Turbofan™, which enable airlines to obtain decisive advantages in the growing aviation market.

Examples of product innovations:

- **High-speed low-pressure turbine**
key component in Geared Turbofan™; awarded the German Innovation Prize
- **Titanium aluminide**
new lightweight and heat-resistant alloy

Examples of process innovations:

- **PECM**
new method for the electro-chemical machining of nickel blisks, blades and disks from a single workpiece
- **Additive techniques**
techniques 3D printing in engine manufacturing

Example of work on future innovations:

- **Bauhaus Luftfahrt**
think tank for questions concerning the future of aviation

An improved high-pressure compressor for the next generation of Geared Turbofan™ engines in MTU's test cell (Rig 268).



2.3 Fuel efficiency (GRI G4-EN7)

Because of climate change and resource scarcity, it is imperative to consume less energy. Through various measures, MTU is working to further improve the fuel efficiency of aircraft engines in order to reduce the overall energy requirements of the aviation sector.

In the development of aircraft engines, the biggest focus is on energy efficiency; in other words, reducing the amount of fuel consumed during flights. Saving fuel not only minimizes resource consumption, but also reduces airlines' operating costs, of which the fuel kerosene accounts for about 30 percent.

45 percent

Today's aircraft engines consume 45 % less fuel than they did in the 1960s. Further efficiency increases are planned.

In addition, energy efficiency is crucial to the aviation industry's environmental performance because fuel consumption and CO₂ emissions are directly proportional to each other. The less kerosene that has to be burned in flight, the lower the environmental impact the aircraft. By 2050, our Clean Air Engine agenda wants to reduce the fuel consumption of aircraft engines by 40 percent (compared to levels in the year 2000). To this end, we make a decisive contribution to the European industry and research sectors' Strategic Research and Innovation Agenda (SRIA) (<http://www.acare4europe.com/>) and its fuel reduction goals.

Greater thrust efficiency, higher thermal efficiency and higher component efficiency can result in greater energy efficiency for the engine. MTU is working on all three of these measures. Introduction of the Geared Turbofan™ is already reducing fuel consumption by 16 percent compared to its ungeared predecessor. MTU is realizing this concept together with Pratt & Whitney. The new engine family reached the following milestones in 2016:

- A320neo: Start of regular flight service with Lufthansa
- C Series models C100 and C300: Start of regular flight service with Swiss Air and Air Baltic
- A321neo: Certification by American and European aviation authorities
- Irkut MS-21: Certification by American aviation authority
- Embraer E190-E2: Start of flight testing

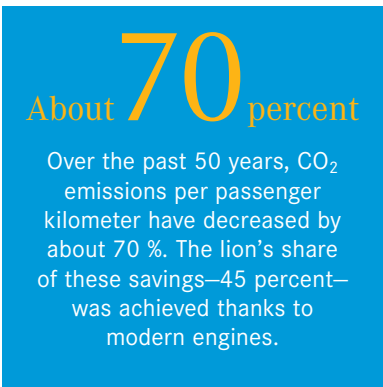
Engine manufacturers are introducing upgrades for existing products to improve their energy footprint and increase their service lives, even though every change subsequent to type approval has to be recertified for safety reasons. Examples from the MTU product portfolio include the V2500 SelectOne (1 % reduction in fuel consumption/approx. 20 % increase in service life) and the V2500 SelectTwo (1.5 % reduction in fuel consumption/approx. 20 % increase in service life).

Also in 2016, MTU tested an improved high-pressure compressor for the A320neo Geared Turbofan™ on its test rig. In the medium-term, plans are to reduce fuel consumption and CO₂ emissions in the second generation engines by ten percent by means of higher bypass and overall pressure ratios along with improved component efficiencies.

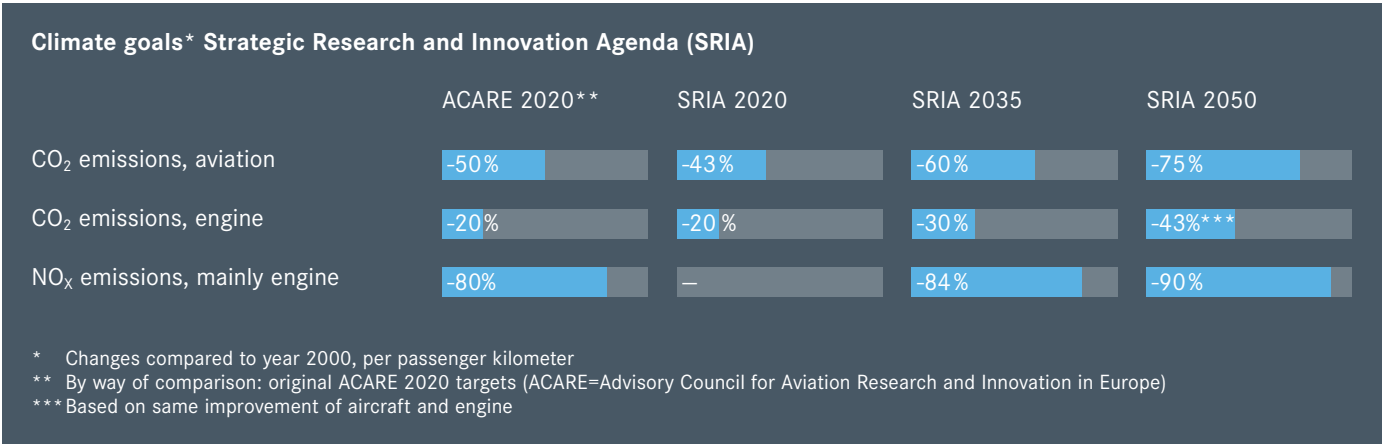
2.4 Climate strategy (GRI G4-EN27)

We are working on solutions to make flying more environmentally friendly. Through our climate strategy, we are actively helping reduce the carbon footprint of aviation. By far the biggest volume of our products' CO₂ emissions are generated during their use, but we are also working to improve the carbon footprint of our production activities.

Climate change is one of the greatest global challenges of our time. It is generally accepted that CO₂ emissions caused by human activity are largely responsible for global warming, and that the increasing mobility of the human population is a contributing factor. Global air traffic also contributes to CO₂ emissions. Aviation changes our climate by generating carbon dioxide (CO₂) and nitrogen oxide (NO_x) emissions and producing cirrus clouds and contrails. CO₂ emissions have the greatest impact on climate. The main leverage point for MTU is that of reducing CO₂ emissions through more efficient engines, to which end MTU helps make compressors and turbines more efficient and lightweight and with higher pressure ratios. As the combustor does not form part of MTU's standard product portfolio, the emissions of NO_x, CO, hydrocarbons and soot during flights lie outside our sphere of influence. Depending on the weather conditions, contrails and cirrus clouds are generated at higher flight altitudes and can be mitigated by means of different flight paths or flying at lower heights.



The air transport sector will continue to experience strong growth. Experts predict that the market will grow annually by 4.5 percent. This means that air traffic will double every 16 years. Accordingly, the European aviation industry has set specific targets to reduce its impact on the environment (Strategic Research and Innovation Agenda <http://www.acare4europe.com/>).



MTU has committed itself to these goals and wants to contribute to aviation achieving carbon-neutral growth in the medium term and reducing CO₂ emissions in the long term. Our responsibility to protect the planet is enshrined in our MTU Principles, where we state our commitment to reducing emissions and limiting consumption of natural resources and energy. These Principles apply in equal measure to our products and our production process. In this vein, we plan to make greater use of simulation techniques to reduce the construction of prototypes and the number of test runs.



Michael Schreyögg
Chief Program Officer
at MTU Aero Engines AG

“We promote greater environmental protection and our product strategy pursues clear targets for eco-efficient engines. We aim to cut CO₂ emissions by 40 percent by 2050. Our agenda will help ensure a sustainable future for aviation.”

Our climate change strategy will enable us to gain a decisive edge over our competitors. This is because engines with a smaller carbon footprint consume less fuel and thus help reduce customers' costs (see 2.3 Fuel Efficiency of Products). In addition, the strategy will help us meet the CO₂ requirements defined by the International Civil Aviation Organization ICAO. The ICAO is successively tightening its environmental regulations for aviation. In 2016, the UN civil aviation organization finalized a new climate agreement on the offsetting of CO₂ emissions (see interview). For NO_x, unburned hydrocarbons, carbon oxide and soot, there are already limits in place. Preparations are underway to introduce special limits for non-volatile particulate matter.

Three questions for Dr. Jörg Sieber, Head of Innovation Management at MTU, about the new ICAO climate agreement.



What agreement did ICAO, the UN's civil aviation organization, finalize at the end of 2016?

“The new agreement requires members to offset growth-related greenhouse gas emissions caused by international aviation from 2020 onward. Following the 2015 Paris climate agreement, this means that there is now an industry-specific climate protection mechanism in place for the first time.”

What does that mean for aviation?

“Aviation is supposed to achieve carbon-neutral growth from 2020 onward. The offsetting of greenhouse gases is to take place in stages, on a voluntary basis initially and then on a compulsory basis for all ICAO members from 2027. This is an important step toward decarbonization, as—based on current levels—this would mean offsetting 80 percent of additional CO₂ emissions between 2020 and 2035 by means of climate protection measures.”

What contribution does MTU make?

“Through our Clean Air Engine agenda, we've already been pursuing a product-related environmental program for years, and we've already made some big initial progress on this front. Five aircraft families have adopted the new Geared Turbofan™ engine, which produces up to 16 percent less CO₂. And we're already working on new technologies to make the engine even cleaner.”

www.icao.int

MTU agenda: Clean Air Engine 2050

With Clean Air Engine, MTU has initiated its own three-stage model for climate protection, one that follows the SRIA emissions goals as closely as possible. According to Clean Air Engine, the engines of future airliners are to cause 40 per cent fewer CO₂ emissions by 2050.

Stage 1: 2020

In the first stage, a Geared Turbofan™ will reduce CO₂ emissions by about 16 percent. In early 2016, the new engine design entered regular service for Lufthansa as the propulsion system for the Airbus A320neo (neo stands for new engine option). According to Lufthansa's own figures, the airline thereby saves around 5,000 tons of CO₂ per aircraft every year, which is the equivalent of 485 flights between Berlin and Paris. In addition, Swiss Air has been operating the new C Series regional aircraft powered by Geared Turbofan™ technology since July 2016. The engine has also been chosen for a further three new aircraft models which are due to enter production successively by 2020 and which will improve environmental performance in their thrust classes.

Stage 2: 2030





Stage 2 of Clean Air Engine will involve refining the Geared Turbofan™. Engineers want to further increase the bypass ratio and improve the thermal efficiency of the core engine by means of higher pressure ratios and temperatures.

Such actions are intended to reduce the carbon footprint by 25 percent. To that end, MTU will improve its high-speed low-pressure turbine. Technologies for high-pressure compressors with an extremely high pressure ratio are necessary to achieve this high overall pressure ratio. The engine is expected to be ready around 2030 in time for the next generation of aircraft. In initiatives such as Clean Sky, MTU is already working on the preliminary design of this engine and on providing the requisite technologies.

Stage 3: 2050

In the third and final stage, entirely new concepts will be put into practice, such as integrated and distributed fans to increase thrust efficiency or highly efficient heat engines. This should enable a 40 percent CO₂ reduction. The concepts are expected to be production ready by 2050. We are already exploring them in initial studies, and we plan to intensify this research from 2017.

As an integral part of our research activities, we regularly compile interim reports in which we compare our progress to our objectives and measure our goal attainment. We are currently on schedule with all Clean Air Engine agenda projects and have achieved the goals for 2016.

Clean Air Engine (Claire)				
GRI G4-EN27				
	Entry into Service	Propulsion component	Core engine	
Stage 1 Geared Turbofan	2015	Geared turbofan bypass ratio ~ 12	Gas turbine overall pressure ratio ~ 50	 -15 %
Stage 2 Ultra-High Bypass Ratio Engine	2030	Geared turbofan bypass ratio 15-20	Gas turbine overall pressure ratio up to 70	 -25 %
Stage 3 Integrated Ultra Efficient Engine	2050	Integrated engine low specific thrust	Highly efficient heat exchanger	 -40 %
				 CO ₂ emissions

Alternative fuels

In addition to increasing the efficiency of engines, using alternative fuels is also an important approach for reducing the CO₂ emissions produced by aviation. MTU actively promotes efforts to spread the use of fuels with low carbon content, e.g. through Bauhaus Luftfahrt (www.bauhaus-luftfahrt.net), field tests, or the Aviation Initiative for Renewable Energy in Germany (aireg e.V. www.aireg.de), which MTU co-founded. The goal of aireg is for bio-kerosene to make up ten per cent of all aviation fuels used in Germany by 2025. MTU supports this undertaking as an active member of the organization.

The development of cost-effective manufacturing techniques for sustainable fuels is still in its infancy, because—in contrast to road transport—the use of new fuels in aviation is highly restricted: to factor in range, aviation fuels must have a very high energy density, a very low freezing point (at cruising altitudes, temperatures can be as low as minus 50 degrees Celsius) and—for safety reasons—a high flashpoint. The decisive factors determining CO₂ reduction are the base substances and the manufacturing processes used to produce these fuels. Bio-based fuels absorb the same amount of CO₂ from the atmosphere while the biomass is growing as they release again during combustion, permitting significant CO₂ reductions compared to conventional kerosene. As the crops involved must not have a negative impact on food production or compromise biodiversity, the selection of suitable species is crucially important.

Several second-generation biofuels have been approved for flight operations, so-called drop-in fuels with the same properties as conventional kerosene. They can be used in all aircraft and at all airports. Pioneering airports such as Oslo, Amsterdam and Brisbane—bioports as they are known—offer a regular supply of these fuels on a commercial basis.

Synthetic fuels represent a long-term alternative to biofuels. MTU took part in the SolarJet project (www.solar-jet.aero), which established the principles for making solar kerosene. This would allow the production of fuel directly from solar energy in desert areas—without competing with the food supply. In the successor program SUN-to-Liquid, this approach is being further pursued.

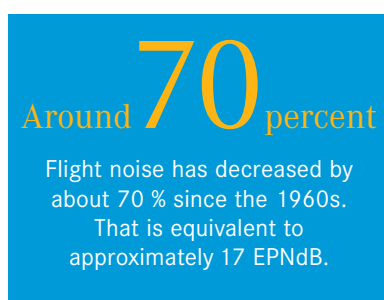
In 2016, MTU was also involved as an industrial cooperation partner in the InnoTreib (Innovative Fuels of the Future) project by the German Federal Ministry for Economic Affairs and Energy. Researchers have developed designer fuels that are better than today's kerosene: higher energy densities for greater range or reduced emissions through a lower percentage of aromatic compounds. For these “near-drop-in” fuels, the combustor and the fuel system of the engine must generally be overhauled. The InnoTreib project was completed at the end of 2016 and showed that significant reductions in pollutants are even possible through optimized fuel composition in keeping with the specifications for kerosene.

A much-discussed topic concerning the future of aviation is electric flying, and MTU is also looking at this issue. In our estimation, current technology is still several decades away from electric-powered passenger aircraft the size of an A320. First, substantial advances are needed in the performance of batteries and electric motors. Electric drive systems with a battery and electric engine are now available for motor gliders and small aircraft. If batteries continue to advance at the same pace, short-range regional electric-powered aircraft might be possible in 30 years. But at present there are no known battery concepts that would be appropriate for medium-haul and long-haul aircraft. Hybrid drive concepts consisting of a gas turbine with a generator and electric fans, by contrast, are opening up completely new possibilities for lowering aircraft resistance. MTU is already testing these drive concepts as an integral part of the Clean Air Engine technology agenda, stage 3.

2.5 Flight noise (GRI G4-EN27)

We are developing engines that are increasingly quieter. In this way, we want to help bring about an overall reduction in flight noise. After all, flight noise is a major concern for airlines and airports. Society's acceptance of air transport is critically dependent on it.

Flight noise originates from several sources. Engines produce the most noise during takeoff, and most of this comes from the fan and airflow. The aircraft itself also causes noise because of turbulence generated at the fuselage, wings and landing gear.



Aircraft and their engines must meet noise emissions limits (classified into noise standards) set down by the International Civil Aviation Organization (ICAO) as part of their certification process. A new noise standard (Chapter 14) will apply to all new aircraft models that are certified from December 31, 2017. The new standard is seven EPNdB (Effective Perceived Noise Decibels) quieter than the current Chapter 4 standard, which means significantly stricter maximum noise limits. As a result, fewer people will be affected by flight noise in the future. Furthermore, at almost every airport in the world, the fees charged for landing and takeoff are dependent on the certified noise standard of the aircraft model. These policies are putting more and more restrictions on the operation of noisy aircraft.

Engines in which MTU has a workshare are always among the quietest on the market, coming in significantly below the legally prescribed limits. The GP7000 powering the A380, for example, was comfortably quieter than the impending new noise standard upon its market launch in 2008—and that despite the fact that the aircraft was very heavy. Noise reduction is an active goal for MTU engineering. Every time MTU redesigns or optimizes an engine, it incorporates measures designed to reduce noise. Our team of acoustics

experts is involved in every stage of product design and contributes MTU expertise to collaborative technology programs and research projects. In 2016, MTU and its research partners completed the LeiLa project for quiet aircraft propulsion. Since 2012, MTU aeroacoustics experts had been developing and testing new low-noise turbine blading as part of the project.

Research programs and collaborations in which MTU was involved in 2016 and their goals for reducing flight noise (selection):

- Clean Sky, Clean Sky 2:
minus 16 to 20 EPNdB
- ENOVAL:
minus 9 EPNdB for encased engine
- LeiLa:
minus 3 decibels for low-pressure turbine

<http://www.cleansky.eu/>

<http://www.enoval.eu/>

MTU is also pursuing specific flight noise goals as part of the Clean Air Engine agenda. We are seeking to reduce noise by 50 percent by 2030 (stage 2) and 65 percent by 2050 (stage 3). Through Clean Air Engine, we are actively supporting the SRIA goals of reducing flight noise by 55 percent by 2035 and by 65 percent by 2050.

Around **75** percent

The noise footprint in the area surrounding an airport is about 75 % lower with the Geared Turbofan™ co-developed by MTU.

In 2016, we achieved the first stage of our Clean Air Engine agenda with the Geared Turbofan™. The large, decoupled and therefore slowly turning fan makes the Geared Turbofan substantially quieter. MTU's high-speed low-pressure turbine rotates three times faster than a conventional turbine. As a result, it does not generate the low-frequency noise that is so poorly absorbed in the atmosphere. The Geared Turbofan's noise footprint (the distribution of aircraft noise in the area surrounding an airport) is reduced by 75 percent and well below the stricter Chapter 14 noise standard. Subsequent generations of the Geared Turbofan will be even quieter.



The first generation of Geared Turbofan™ engines, as pictured here on the wing of an Airbus A320neo, already significantly reduces aircraft noise levels.

2.6 Product quality and safety (GRI G4-PR1-3, PR5, PR9)

Quality and safety are of paramount importance in aviation. Safe flight operation is a legal requirement. We ensure the flawless quality and safe operation of our products over the entire lifecycle. Of course, we also fulfill all legal regulations and requirements.

We examine our engine modules for their impact on health and safety throughout their development, production and operation lifecycles. Accordingly, we cover all major stages of a product's service life 100 percent. MTU's experts incorporate all safety and environmental requirements for aviation products as legally mandated by the industry's regulatory authorities. Such regulatory requirements must be met in the early stages of planning new engines for later use, and compliance must be documented. We employ a comprehensive testing program involving test builds and series tests to verify the safe flight operation of our products. This includes being able to ensure safe operation during a bird strike or hailstorm and complying with strict limits on pollutants and noise emissions. MTU components frequently exceed aviation authority requirements. In addition, the manufacture of engine parts and modules in production shops meets all required standards concerning occupational safety and environmental protection.

MTU Safety Management is the name of an internal body of rules defining how to handle safety-related events. Appropriate organizational structures, responsibilities and processes are established in accordance with an international standard (ICAO SMS Manual).

Certifications

MTU has all the requisite approvals and certifications from national and international aviation authorities to develop, manufacture and maintain flight-ready engine parts and modules (<http://www.mtu.de/engines/quality/>). A group-wide integrated management system (IMS) certified under EN 9100 and ISO 9001 ensures compliance with laws and regulations and clear assignment of responsibilities within the company. The quality framework is binding for management and employees. Corporate Quality is a separate department directly subordinate to the Chief Operating Officer (COO) and reports quarterly to the Executive Board.

Each and every part in the engine must be approved. Our principle is that "Safety takes priority in what we do," which is why we use only approved, fault-free and clearly identifiable components. This refers to parts that have been approved by the appropriate aviation authority, are based on approved development documentation and have been produced or repaired in compliance with aviation regulatory processes by a certified company.

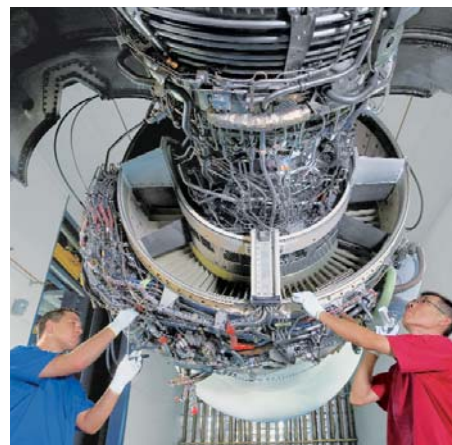
Moreover, the aviation sector has strict rules governing documentation in order to verify the



Aircraft engine designs must meet strict quality requirements.



All manufacturing processes are subject to approval by the aviation authorities.



We work according to the principle that "safety takes priority in what we do".

airworthiness of components and engines. There must be no gaps in documentation for the entire product lifecycle. We adhere to this principle at each stage of the production process. We have adopted internal policies on the handling and storing of documents, data and records in order to meet the requirements of regulatory authorities, partners and customers.

Product compliance (GRI G4-PR2, PR9)

We have implemented comprehensive monitoring and testing processes to ensure compliance with quality and safety requirements. Monitoring takes place throughout the entire value chain. Stringent audit, review and gating procedures are well established across all product phases. In addition, the aircraft manufacturer and the airlines, in their capacity as customers, conduct field tests on all specifications independently of the engine manufacturer's own data.

Safety-critical components (engine components are categorized into various safety classes) are subjected to particularly rigorous testing to verify their technical quality. Each component goes through different testing stations during the course of the production process to check that it is being manufactured in precise accordance with set tolerances before it is approved. Manufacturing to the highest quality standards is not merely enormously important for safety reasons, but also for economic ones. Engine components increase in value throughout the course of their production, which means a lot of capital is tied up.

Strict requirements also apply to materials. 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.

We comply with our customers' requirements, regulations and laws as well as internal standards throughout the entire production process. Aviation authorities conduct compliance audits to strictly monitor any engine we manufacture, and the customer routinely performs both internal and external audits. Audits at all MTU sites ensure that our standards are upheld worldwide. In 2016, we carried out 443 audits across the MTU Group. In addition, we passed 119 audits conducted by customers and certification bodies with flying colors. In 2016, no breaches of statutory regulations were observed in connection with the purchase or operation of our products, nor were any fines imposed on MTU. Neither were there any incidents or breaches of

Flight safety

According to the current safety report by the International Air Transport Association (IATA), the accident rate for worldwide air traffic has been falling for years. In 2016, the figure of 1.61 accidents per million aircraft movements (takeoffs or landings) was lower than ever before.

One way to measure the reliability of aircraft engines is their in-flight shut-down (IFSD) rate. Today's engines achieve an IFSD rate of below 5×10^{-6} per flight hour. This means that an engine needs to be switched off once every 200,000 flight hours. Or to put it another way, the pilot of a twin-engine aircraft is forced to switch off an engine once in a hundred years.

statutory regulations or internal guidelines in relation to the health or safety-relevant effects of our products and services in the reporting year.

We have equally high expectations of the quality provided by our suppliers and their vendor-supplied parts. Each supplier must be approved by MTU and is routinely audited by MTU's quality controllers.

Sustainable product lifecycle

During development, production, use and disposal, we test and evaluate the environmental and safety impact over the entire lifecycle of an aircraft engine. Development is the most important thing. Our mission in any collaboration is to design every new engine so that it is more fuel-efficient, less polluting, and quieter than its predecessor.

Development: Aircraft engines can spend up to 30 years in service. This extremely long service life is a design specification, meaning that during product development, the service life of each component is determined with that of the engine in mind. By developing new technologies and materials, MTU has extended—in some cases, doubled—the service life of life-limited parts. Moreover, the subsequent resource consumption and CO₂ emissions of the engines during their service life is determined at the development stage. For this reason, MTU laid down objectives for more sustainable products through its Clean Air Engine technology agenda (> see 2.4 Climate Strategy).

Sustainable lifecycle	
Lifecycle	Actions
Development	• Clean Air Engine
Production	• Environmental management
	• Additive manufacturing
	• Sustainability standards for suppliers
Service life	• MTU ^{Plus} Engine Trend Monitoring
	• MTU-repairs
Recycling	• MTU ^{Plus} Mature Engine Solutions

Service life: Generally, an engine will complete between 20,000 and 30,000 flight hours before it is taken off the wing and has to be given its first overhaul. MTU Maintenance has developed its own innovative repair processes, which gives it capabilities that are unique worldwide and reduce the consumption of resources. MTU is gradually expanding this repair capability by developing new special processes. For example, we made good progress in 2016 with our repairs for the V2500 fan casing. Previously, the plastic inner paneling of the fan casing had to be replaced frequently. A unique new MTU repair method has reduced the scrap rate and substantially increased the component’s service life. MTU’s ERCoat^{eco} erosion protection for compressor blades and vanes also extends service

life in desert regions while cutting fuel consumption by making these blades wear-resistant. This made it possible to reduce the scrap rate by 30 percent and cut fuel consumption—and therefore CO₂ emissions—by 0.5 percent.

Recycling High prices for titanium and nickel, plus some alloying elements such as platinum and rhenium, make engines very valuable, so that they are almost fully reused in different ways at the end of their service life. Components that have not yet reached the end of their maximum service life are reused as spare parts. Certain materials can also be directly employed in non-aviation applications. Recyclers collect the remaining materials for material manufacturers to melt down and put back into circulation. As a vendor, MTU has no direct influence over the scrapping of engines, which is carried out by specialist companies. For older engines, we offer tailored solutions for disassembling and recycling components.

Customer satisfaction (GRI G4-PR5)

For MTU, high customer satisfaction is a key metric for product quality. It is enshrined in our corporate objectives (“Our customers receive products and services on time and on quality”) and is a crucial factor for the company’s long-term success. Our quality management system, which is certified to ISO 9001, is designed first and foremost to ensure customer satisfaction, process orientation and continuous improvement. For 2017, we are seeking to make our customers even happier with our performance. To this end, a systematic customer dialog helps us improve quality further. In our new engines and spare parts business (OEM segment), we achieved an on-time delivery rate of 95 percent in 2016. In 2017, we want to increase this rate to 96 percent. Our strategic cooperation partner Pratt & Whitney recognized MTU in 2016 by making us the only supplier to receive a Sustainable Supplier Award in the categories Resource Conservation, Ethics, Labor Guidelines and Safe Workplace Standards. In order to increase our on-time delivery rates even further, we have a Shopfloor Management system in place, whereby workers and managers meet up every day to discuss the current production status and, if there are any problems, to promptly initiate measures to remedy them. We are gradually rolling Shopfloor Management out across other MTU sites outside Munich and also in administrative departments.



MTU Maintenance draws on feedback from its customers to continuously improve its repair and service offerings.

MTU Maintenance offers repair and additional services for aircraft engines and industrial gas turbines. Most of its customers are airlines, leasing companies and energy producers. Direct interaction with customers forms the basis of customer care. For this purpose, customer advisers use a customer relationship management tool (Voice of the Customer module) which regularly measures current satisfaction levels. The survey takes place once a quarter for all major sites, including Hannover, Ludwigsfelde and Vancouver, and for all main products. Each customer has the option of providing feedback about product quality, service, logistics and commercial terms. We actively use this feedback in order to identify areas for improvement and to initiate measures accordingly. Our goal is to improve our performance and continuously increase customer

satisfaction as means of staying competitive. In addition, MTU Maintenance Lease Services runs its own measurement system in the area of engine leasing and asset management.

2.7 Responsibility for the supply chain

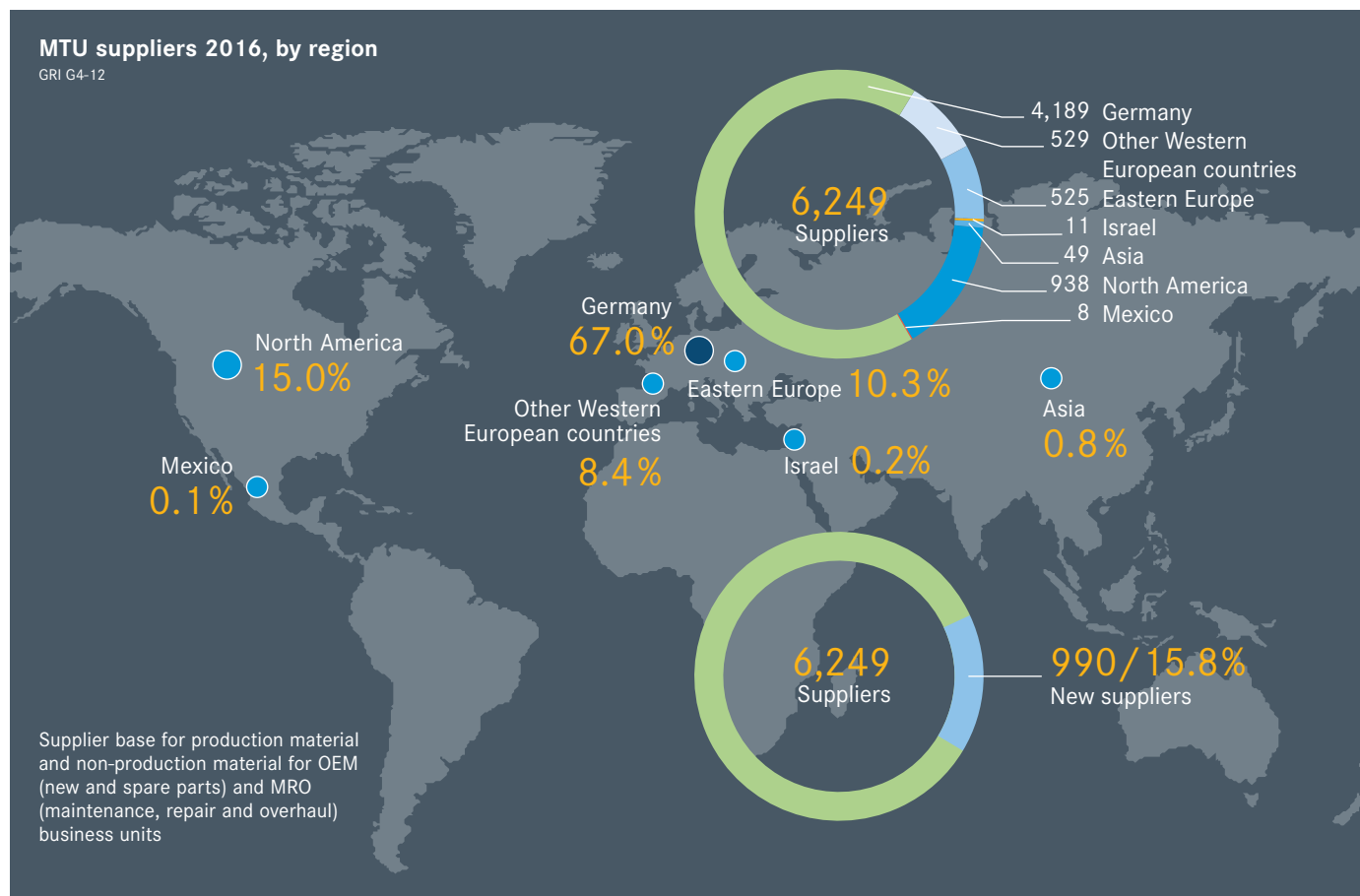
As a responsible engine manufacturer, we strive also to ensure, insofar as possible, that the parts of the value chains for our products that lie outside our factory walls are sustainable. Supply chain sustainability is part of our CR strategy, and we practice it through our responsible sourcing approach.

Responsible sourcing management approach

The value creation of an MTU product contains important pre-production stages at external suppliers. For this upstream value creation, we seek to ensure sustainable procurement and pay attention to the observance of standards within our sphere of influence. We have summarized our sustainability efforts for the supply chain under the heading Responsible Sourcing, which we take to encompass environmental and social aspects as well as transparency in the supply chain. Sustainability in the supply chain is very important both for MTU and for its stakeholders. The most important instrument is a Code of Conduct for Suppliers, which lays down binding environmental and social standards in the supply chain. Moreover, MTU's General Terms and Conditions

of Purchase also contain environmental, social and compliance requirements.

We work together with a large number of suppliers and subcontractors from different countries. Today's supply chains are global and have many branches. This complexity compels us to concentrate on the supply stage directly upstream from us (Tier 1). In 2016, the MTU Group purchased goods and services from 6,249 suppliers (2015: 4,582). The purchasing volume was about 2.2 billion euros for production and non-production material (2015: 1.86 billion euros). Of this total amount, 39.9 percent was not subject to any purchasing restrictions, unlike the remaining 61.5 percent, where the OEMs impose strict conditions, especially in the repair business. The



higher procurement volume and the larger supplier base compared to the previous year are attributable to two causes: the expanded group reporting entity of the present report (see Reporting Principles) and the production ramp-up in the Geared Turbofan™ programs. In the reporting year, the MTU Group worked together with 990 new suppliers, which corresponds to 15.8 percent of all suppliers (2015: 10.6 percent).

Comprising 93.5 percent of purchasing volume, the markets in Western Europe and North America, which are so important generally for the aviation industry, account for the lion's share of MTU's procurement. 90.5 percent of our suppliers are based in those countries. In the OEM business for aircraft engines, we procure across the entire breadth of the supply chain, from blanks to finished parts. We always source castings and forgings externally, and the same goes for special materials for which MTU has not built up manufacturing expertise, such as electronic control systems. If possible, we source our supplies directly from blanks or finished parts manufacturers. MTU procures only a small proportion of its raw materials directly. On average, between

53 and 74 percent of the parts required for commercial engine programs are outsourced.

Local procurement (GRI G4-EC9)

MTU does not have any business policy that explicitly defines a purchasing quota giving preference to local suppliers. We procure materials and services from vendors all over the world, and the chief criteria are manufacturing expertise, quality, on-time delivery and price. It is nonetheless in MTU's interests to cultivate and expand its relationship with German industry where appropriate. Local content is particularly important when purchasing non-production material and services, and there is a wide variety of goods and services available locally. We procure non-production materials predominantly in the regions in which we operate (see GRI G4-12, Purchasing Volume). For Germany, the local proportion of the purchasing budget for production and non-production material (both business units) was 23.5 percent; for Poland, the figure was 21.8 percent (OEM business only). In our MRO business, we are bound by the manufacturer's specifications as regards the production material we can use.

Purchasing volume by region in 2016 (in EUR m)

GRI G4-12



Total purchasing volume of OEM (new and spare parts) and MRO (maintenance, repair and overhaul) business units for production material and non-production material.



Sustainability standards in the supply chain

We have established a binding Code of Conduct for Suppliers that forms an important basis for all our contracts with suppliers

(<http://www.mtu.de/company/compliance/code-of-conduct-for-suppliers/>).

It defines the following social and environmental standards: respecting internationally recognized human rights, observing the ILO's (International Labour Organisation's) core labor standards, protecting the environment and combating corruption. The Code of Conduct for Suppliers is an integral part of the contract and is based on the ten principles of the UN Global Compact. Each contract signed by a supplier includes the commitment to abide by these principles. We expect our suppliers to communicate MTU's standards to their own supply chains and take measures to ensure that they are complied with. The Code of Conduct applies to suppliers of the European manufacturing sites and of MTU Maintenance Canada and MTU Aero Engines North America, and therefore to 75 percent of the group reporting entity.

Suspensions that the Code of Conduct may have been breached can be reported to MTU's ombudsman (ombudsmann@mtu.de). Should a supplier be implicated in charges of corruption, extortion, embezzlement or the utilization of child labor in the execution of a contract for MTU, the collaboration agreement will be terminated without notice. If other principles of the code are violated, the supplier must demonstrate that suitable corrective measures have been initiated and implemented and must guarantee this in writing. No accusations of possible breaches of the Code of Conduct were reported during the period under review. Neither were there any complaints about suppliers. MTU reserves the right to carry out on-the-spot audits to verify compliance with the Code of Conduct.

In our General Terms and Conditions of Purchase for our European sites, we also insist on compliance with the EU's REACH chemicals regulation.

A large number of components in MTU's products are supplied by external vendors. We define strict quality, social and environmental standards for the entire upstream value chain.

Risk management and assessment

(GRI G4-EN32/33, LA14/15, HR1, HR5/6, HR10/11, SO9/10)

We seek out long-term relationships with suppliers. In the OEM business unit for aircraft engines, for example, about 85 percent of the purchasing volume is based on contracts with a term of two or more years. All suppliers are vetted before being accepted as a member of MTU's supply chain. This process includes a binding supplier disclosure and contractual undertaking to comply with the Code of Conduct. Moreover, MTU's purchasing strategy experts carries out a risk assessment for some suppliers. At present, this assessment relates to commercial risks for MTU. To cover environmental aspects, we demand proof of certification to standards such as ISO 14001. In 2015/2016, we revised our guidelines on the approval of suppliers in order to take greater account of environmental aspects, such as hazardous materials. Using audits and periodic evaluations, we regularly review existing suppliers, including with respect to their ISO 14001 certification. In 2016, we carried out a total of 367 audits on all major suppliers, which included on-site inspections and interviews. Once approved, suppliers of production material must regularly demonstrate their ISO 9001 compliance anew via re-certifications. In 2016, we also revised our internal risk survey, adding new elements such as sustainability issues in the supply chain.

In the reporting period, our supplier checks showed up no substantial risks for MTU. If any such risks should be discovered, the approval of the supplier in question may be withdrawn. Neither was any cooperation terminated because of sustainability deficiencies or other complaints, nor did we discover any risk of compulsory, forced or child labor at any of our suppliers.

In 2016, we held training on CR-oriented supplier management for purchasing staff in Munich for the first time. These training courses will be continued. In addition, we regularly provide purchasers with training on professional compliance behavior and on the MTU Code of Conduct, which applies to all the company's employees and proscribes corruption, bribery, the granting of undue advantage, and anti-competitive behavior.

Transparency in the supply chain

(GRI G4-HR5/6, HR11)

MTU's commitment to sustainability includes a transparent value chain that excludes the use of conflict minerals. We never deliberately purchase conflict minerals, but they can find their way into our production or pre-production due to the complex links at the various levels of our global supply chain. Such minerals include tantalum, tin, gold and tungsten, which can be found in certain components of engines manufactured by MTU. These minerals can cause problems for a company with a responsible procurement policy because many of them are mined in countries of Central Africa where the profits of the government-controlled mining industry may be used in conjunction with financing armed conflicts in which human rights are not respected. According to the provisions of the Dodd-Frank Act applicable to companies listed on stock exchanges in the United States, MTU's American partners and customers require that MTU disclose the origin of minerals used and limit its sources to certified mining companies and primary-alloy producers (Compliant Smelter List).

In turn, MTU demands that its relevant suppliers should specify the origin of such minerals, in order to ensure that the value chain contains only conflict-free raw materials. MTU's procurement guidelines require suppliers to provide information about the source of minerals in accordance with the EICC/GeSi Conflict Minerals Reporting Standard. To date, no infractions have come to the knowledge of MTU that infringe on the principles of the Dodd-Frank Act. The Code of Conduct for Suppliers moreover prohibits the use of child labor. MTU reserves the right to terminate any contract with a supplier using child labor to manufacture products supplied to MTU, without prior notice.

We are closely following developments in the EU vis-à-vis regulating the use of conflict minerals, so that we can implement the provisions as required.



3 Environmental protection

Climate change and the scarcity of resources are global challenges we must meet as a manufacturing company. Our response is based on energy-efficient production that minimizes emissions and raw material consumption so that we can make our environmental impact as small as possible. Likewise, our products help reduce our clients' emissions and energy consumption.



Main GRI aspects covered by this chapter:

- | | |
|---|--------------------------------------|
| ■ Organizational profile (precautionary approach) | ■ Effluents and waste |
| ■ Materials | ■ Compliance |
| ■ Energy | ■ Transport |
| ■ Water | ■ Overall environmental protection |
| ■ Emissions | ■ Environmental grievance mechanisms |

3.1 Management approach: environmental protection

Environmental protection is an important principle guiding our corporate behavior and, as such, is implemented in our business processes. It is enshrined in our Code of Conduct and in the MTU Principles, and it is established in our annual corporate objectives and in a dedicated program of environmental measures.

Our sense of environmental responsibility encompasses product development, manufacturing and repair. For MTU, the following are key focus areas of our environmental protection efforts in manufacturing and repair:

- Energy consumption
- Emissions
- Water/waste water
- Material efficiency and
- Waste management

We have summarized these aspects in our sustainability strategy under the heading environmental management/performance, which is of great importance both to MTU and to its stakeholders. The most significant way we can help protect the environment is by means of ecologically efficient products, as the environmental impact of our products is greatest during their use. Reducing harmful CO₂ emissions in flight operations is thus a top priority. We implement this through our climate strategy (> see 2.4 Climate Strategy).

All fully consolidated production sites of the MTU Group worldwide are included in our environmental reporting (Munich, Germany; Hannover, Germany; Ludwigsfelde, near Berlin, Germany; Rzeszów, Poland; and Vancouver, Canada). All other locations are small office facilities and have no significant impact in terms of the key aspects, so the effort required to capture and consolidate data would be disproportionate.

MTU's energy-efficient approach to manufacturing and maintenance minimizes emissions and the consumption of raw materials. Minimum operating standards for our machines and facilities, such as engine test cells, are defined by national legislation and local specifications. For machines and facilities with environmental implications, this body of rules and regulations is supplemented by approvals and permits from the authorities. We conduct measurements, tests

Environmental protection investment and expenditure (in Euros) G4-EN31
Waste management
Water protection
Noise reduction
Air pollution control
Nature and landscape conservation
Soil remediation
Climate protection
Total

and inspections at regular intervals to ensure our machines and facilities are operating invariably in accordance with these rules and regulations.

We use resources such as raw materials, energy and water sparingly. In this way, we also create added financial value for the company through lower energy costs. Consumption, emissions, waste water and waste are dependent on production capacity. We make every effort to ensure that these don't rise disproportionately. We treat waste and discharge waste water properly and in accordance with the applicable legal requirements. We apply the precautionary principle in addressing all key aspects of environmental protection.

MTU pursues a policy of integrated environmental protection consisting of:

- Making continuous improvements
- Taking a precautionary approach
- Involving employees
- Limiting environmental impact
- Carefully complying with statutory limits and requirements
- Using resources and energy sparingly

We use various measures to achieve improvements in our energy and carbon footprints. In 2016, MTU invested a total of 4.7 million euros in improving the environmental compatibility of operating activities at its sites.

Munich				Hannover			
2013	2014	2015	2016	2013	2014	2015	2016
619,300	728,895	560,000	634,000	225,563	108,980	164,906	200,076
681,000	572,017	812,000	841,000	372,674	372,487	678,296	608,518
20,000	5,780	0	0	18,000	18,000	25,000	25,000
36,000	83,696	97,000	149,000	952,888	62,096	84,917	293,716
145,000	14,000	34,000	112,400	0	0	0	0
0	0	0	0	0	0	0	0
1,650,000	1,657,340	940,000	1,287,000	629,541	180,460	176,361	572,980
3,151,300	3,061,728	2,443,000	3,023,400	2,198,479	742,210	1,129,480	1,700,290

Only German locations, listed separately, as there are still no unified definitions for the investment categories. We are currently preparing to issue international reports. The indicator has been recorded in the database since 2013. For Ludwigsfelde, this data is gathered on an ad-hoc basis only (if requested by authorities). In 2014 and 2015, this data was not requested. At the date this report went to print, the 2016 data was not available.

Certified environmental management

Responsibility for company-wide environmental protection is assumed by the Executive Board. Implementation is carried out through a certified environmental management system with high standards that apply consistently throughout the company. All processes, responsibilities and objectives are defined in the system. Internal standards are binding for MTU's sites and, in some cases, exceed the legal requirements. The stringent environmental criteria apply to all divisions and processes and are laid down in documented process flows and special standards. Dedicated environmental departments have been set up at all of MTU's production sites, some of which are certified in accordance with ISO 14001, the international standard for environmental management systems, or are validated according to the European EMAS regulations (<http://www.mtu.de/engines/quality/approvals-certifications/>).

Environmental protection management officers at the production sites are responsible for implementing the environmental management system. Individual managers are directly responsible for environmental protection. They are advised and supported in their environmental protection efforts by the relevant technical departments at their site. The environmental departments regularly share their potential solutions and best practices across all sites.



Measures for energy-efficient production include using building automation systems and new lighting systems such as LED lighting.

Monitoring and assessments (GRI G4-EN29, 34)

Independent external auditors and environmental consultants conduct annual reviews to confirm implementation of and adherence to the applicable environmental protection management requirements. MTU passes these reviews with flying colors. This monitoring is supplemented by internal inspections and audits. MTU's management conducts reviews to monitor and steer environmental management in the company and to influence its further development.

Emergency management plans have been prepared to deal with interruptions to operations with a negative environmental impact. This includes regular staff drills and instruction on what to do in the event of an emergency. MTU has comprehensive fire protection measures in place that fulfill all legal directives on fire protection. In 2016, there were no incidents with a negative environmental impact, nor were any fines levied against the company for breaches of statutory requirements relating to the environment.

Stakeholders can direct complaints and report abuses to MTU; this applies to employees, suppliers, residents and other stakeholders. In the reporting period, two complaints were submitted to the competent environmental authority (Department of Health and Environment of the City of Munich, RGU) regarding noise pollution at the Munich facility. In both cases, the authority dropped its investigations against MTU since a review of the test rig operating logs showed that MTU could not have been the cause.

Precautionary principle in environmental protection (GRI G4-14)

As a principle, MTU acts on a long-term basis in all divisions and areas of the company. With regard to environmental risks, the company takes a precautionary approach. As part of our risk management, we carry out regular analyses of environmental risks at production sites in order to record and prevent them. In our environmen-

tal management, we have defined structures and processes and assigned responsibilities. Important production and maintenance locations have a certified environmental management system in place.

Discussing environmental protection with stakeholders

We are in a dialog with our stakeholder groups about MTU's environmental impacts. The company involves its employees in its environmental protection endeavors and promotes environmentally conscious behavior through action days, information campaigns and training courses. We inform the public annually about our environmental impacts and environmental management through statements issued by MTU for its sites in Munich and Hannover, and since 2016, for Berlin.

Also in 2016, we took part in the annual rating of the international non-profit organization CDP to increase the transparency of our company's climate data. On a scale of A to F, MTU achieved a climate score of C in the 2016 rating, improving its score over the previous year. In 2015, it was awarded the title of Germany's Best Improver.

We promote greater environmental protection in industry and business through the following initiatives:

- UN Global Compact
- CDP
- German Environmental Management Association (B.A.U.M.)
- Bavarian Environmental Pact
- Energy Efficiency Network for Munich and Upper Bavaria
- Munich Business Climate Pact (Klimapakt Münchner Wirtschaft)
- YVR Airport Authority environmental initiative



Umwelterklärung 2017
Nachfassung über das Berichtsjahr 2016
für den Standort München der MTU Aero Engines AG



Umwelterklärung 2017
der MTU Maintenance Hannover GmbH
(Daten und Zahlen 2016, aktualisierte Fassung)



Umwelterklärung 2016
Erneuerung über das Berichtsjahr 2015
der MTU Maintenance Berlin-Brandenburg GmbH



2017 in
preparation

German versions
only

3.2 Energy management (GRI G4 DMA Energy, G4-EN3, 6)

We are committed to the principle of efficient energy supply and, in view of growing resource scarcity, to reducing the raw materials and energy we need to manufacture and maintain our engine products. An energy management program ensures continuous improvements.

MTU relies on a mix of renewable and non-renewable energy sources and chooses energy resources based on security of supply, cost effectiveness and environmental sustainability. As non-renewable primary energy, we use natural gas, the aviation fuel kerosene, diesel and a small amount of heating oil. In Munich we operate a cogeneration plant (BHKW 1.0) with renewable energy. We procure the vegetable oil from certified sources. In connection with the Munich Business Climate Pact, the modernization to BHKW 2.0 is planned as a measure for further reducing emissions. The Hannover facility uses solar energy with the aid of a solar thermal power plant. We also achieve greater energy efficiency through a combination principle, in which sites use the heat generated during production as thermal energy.

Measures for energy-efficient production

(GRI G4-EN6)

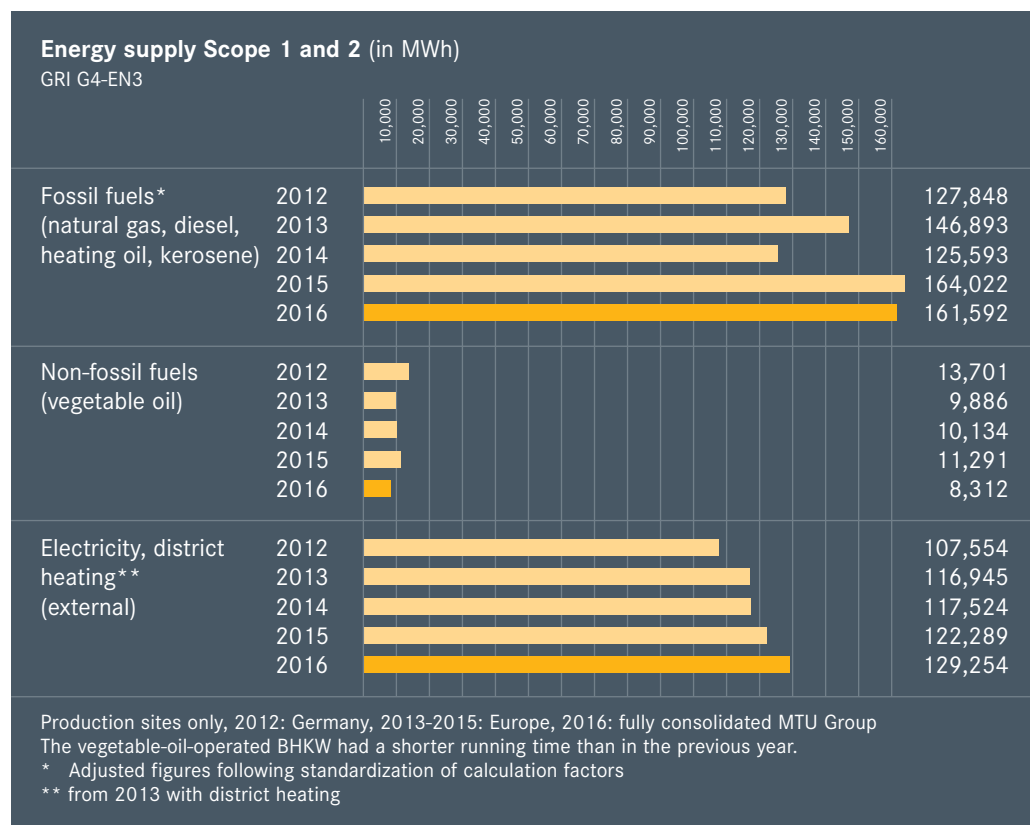
- Using well water for cooling purposes
- Modernizing the district heating network
- Improving thermal insulation
- Using building automation systems
- Using heat recovery systems
- Using renewable energy
- Using energy-efficient compressed air supply
- Using energy-efficient lighting systems
- Using waste heat from compressed air generation
- Using electric in-plant transportation

We have implemented a comprehensive energy management system with which we manage and implement above all the consumption of our main energy sources electricity and natural gas. Together, these energy sources supplied 69 percent of the required energy in 2016. Energy demand in 2016 was at a similar level as in 2015, but it includes the entire MTU Group with the additional production site in Canada. 2.8 percent of the energy consumed came from regenerative sources.

Energy sources used in 2016, Scope 1 and 2 (consumption in MWh and as a % share)

GRI G4-EN3

Fossil fuels		MWh	%
Natural gas	Total	86,841	29.0
	of which production related	86,693	99.8
	of which development	149	0.2
Kerosene	Test beds, total	74,008	24.7
	of which production related	53,971	72.9
	of which development	20,037	27.1
Diesel	Emergency power, plant filling stations	596	0.2
Heating oil	Heating/hot water	145	0.0
Scope 1: Non-fossil fuels			
Vegetable oil	Heating/hot water	8,312	2.8
Scope 2: Purchased energy			
Electricity (external)	Production/development	120,670	40.3
District heating	Heating/hot water	8,584	2.9
Energy consumption			
	Total	299,158	100.0
	of which production related	278,971	93.3
	of which development	20,187	6.7



Because of new Geared Turbofan™ programs in the product portfolio (PW1000G engine family), MTU is currently ramping up production, which continues to result in higher energy demand. Of the total energy demand, 93.3 percent was production related. Kerosene is used as fuel for engine tests on test rigs, and consumption is dependent on the scope of the test run and the size of the engine. The amount of fuel used in 2016 dropped 11 percent to 74,008 MWh due to the use of a different range of tests (2015: 82,703 MWh). MTU has no influence on the type and duration of test runs. We aim to minimize engine development testing by using state-of-the-art computer-aided simulation techniques.

Our digitalization campaign is making strides toward increasing the use of simulations in development and manufacturing. However, all research and development processes still require a prototype that is tested under real conditions in a test cell. For reasons of know-how and cost effectiveness, MTU strives to carry out as many of these test runs in its own test cells as possible. In repair, all engines must complete a test run for safety reasons and to demonstrate performance. Overall, energy consumption from non-regenerative sources dropped to 161,592 MWh in the reporting period (2015: 164,022), which

is due primarily to the lower kerosene consumption.

In 2016, we procured a total of 129,254 MWh of external energy (Scope 2). The increase over the previous year (122,289 MWh) is largely due to the expanded group reporting entity. Our use of green electricity is determined by the extent to which our suppliers feed it into the grid. The proportion of green electricity lies between 14.7 (Rzeszów) and 56.5 percent (Hannover) for European production sites. All electricity for MTU Maintenance Canada is produced by hydro dams.

Progress in energy management in 2016 (selection)

GRI G4-EN6

- Reduction of compressed air leaks through use of ultrasound technology (Hannover)
- LED lighting in production areas (Hannover, Berlin, Rzeszów)
- More energy-efficient lighting (Vancouver)
- Improved thermal insulation of test-rig prefitting facility (Berlin)
- Replacement of six building ventilation systems with a more efficient central system (Hannover)
- More energy-efficient storage systems (Munich)

3.3 Emissions (GRI G4 DMA Emissions, G4-EN15-17, 19, 21)

We want to continuously reduce the greenhouse gas emissions and airborne pollutants produced by manufacturing and repair work in our plants to protect the climate. That's why we design our processes to be energy efficient.

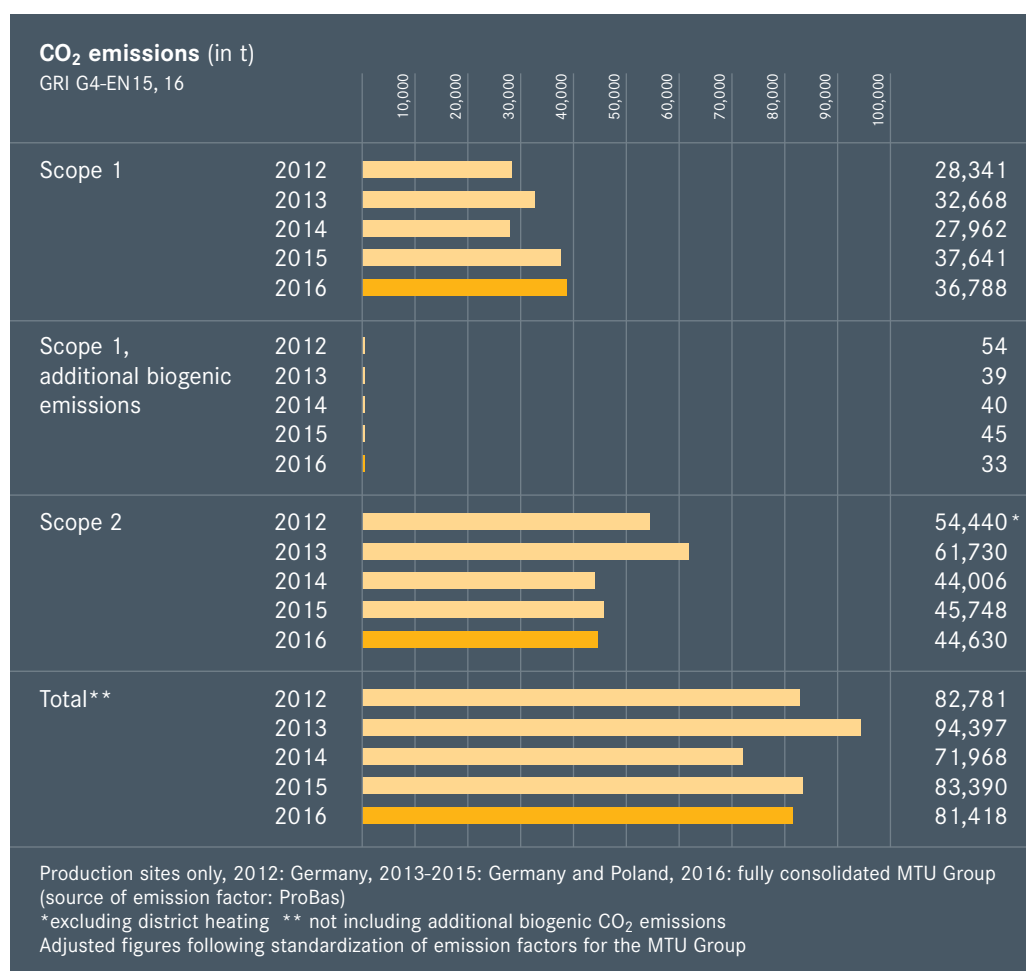
We measure emissions at our production sites in accordance with the international standard of the Greenhouse Gas (GHG) Protocol. MTU emits greenhouse gases that have an effect on the climate as defined by the Kyoto Protocol.

The following gases come under this definition: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), partially fluorinated hydrocarbons, perfluorinated hydrocarbons and sulfur hexafluoride (SF₆).

The only one of these relevant to MTU's emissions is CO₂. Our carbon footprint is made up of direct greenhouse gas emissions (Scope 1) from sources owned by the company and of indirect greenhouse gas emissions (Scope 2) that come from the consumption of bought-in electricity and

district heating. CO₂ emissions from business trips and transports in the logistics chain fall under Scope 3. We recorded these emissions in part for the first time in 2016.

In the reporting year, MTU emitted a total of 81,418 tons of production-related CO₂. In 2016, natural gas accounted for the lion's share of Scope 1 CO₂ emissions with 17,507 tons (22 percent). The aviation fuel kerosene (19,049 tons) was responsible for 23 percent of CO₂ emissions. The main energy source, electricity (43,707 tons), caused the most greenhouse gases, with a share of 54 percent. Demand for electricity and natural gas is dependent on production volume; the amount of kerosene, on the type and duration of test runs.



The Clean Air Industrial Site (CLAIR-IS) program operates at MTU's headquarters in Munich. With the help of this program, we are engaged in reducing the CO₂ emissions at the company's largest plant by 25 percent by 2020 (baseline year: 1990). In total, we have already saved roughly 330,000 tons of CO₂. The program also serves as an example of best practice for other MTU sites.

Examples of annual CO₂ savings

GRI G4-EN19

- Use of well water for cooling purposes: roughly 3,000 tons of CO₂
- Climate-neutral cogeneration plant (BHKW 1.0): roughly 7,400 tons of CO₂
- Electric cars in fleet: 330 tons of CO₂

Upgrading the building automation systems has already led to a savings of 70,000 tons of CO₂.

In 2016, MTU joined the Munich Business Climate Pact, through which major businesses in the city have committed to reducing CO₂ emissions by a total of 40,000 tons per year by 2018. This will be done through climate protection measures in production, building management, infrastructure and mobility solutions. MTU will focus on solutions for more energy-efficient equipment in production ramp-up, and will modernize its BHKW.

Transport and logistics

We also involve our transport and logistics chain in climate protection. Measures include optimizing logistics routes for in-plant transport and using vehicles with better environmental performance or electric motors to reduce fleet consumption. In Munich, for instance, we plan to reduce CO₂ emissions from company vehicles, and in the reporting period, we paved the way to introduce a maximum emissions limit.

Furthermore, MTU promotes sustainable commuting practices among its workforce, for example through a special discounted "job ticket" for the local public transportation network. In 2016 we developed a concept to promote e-mobility among employees at our Hannover site.

Emissions from the transport and logistics chain (excluding owned company vehicles) fall under Scope 3, for which we do not have comprehensive data.

Three questions for Lars Wagner, Executive Vice President, OEM Operations at Munich MTU Aero Engines, on the Munich Business Climate Pact



What is the Climate Pact?

The Climate Pact is a voluntary commitment by companies in the greater Munich region to step up the effectiveness of their climate protection efforts.

Why did MTU join?

Effective climate protection requires pioneers. We see ourselves in that role. For a major corporation like MTU, the focus is not only on the environmental impact of our products, but also on the energy footprint of our production sites. And because our headquarters is located in Munich, the city is of particular significance to us as a company.

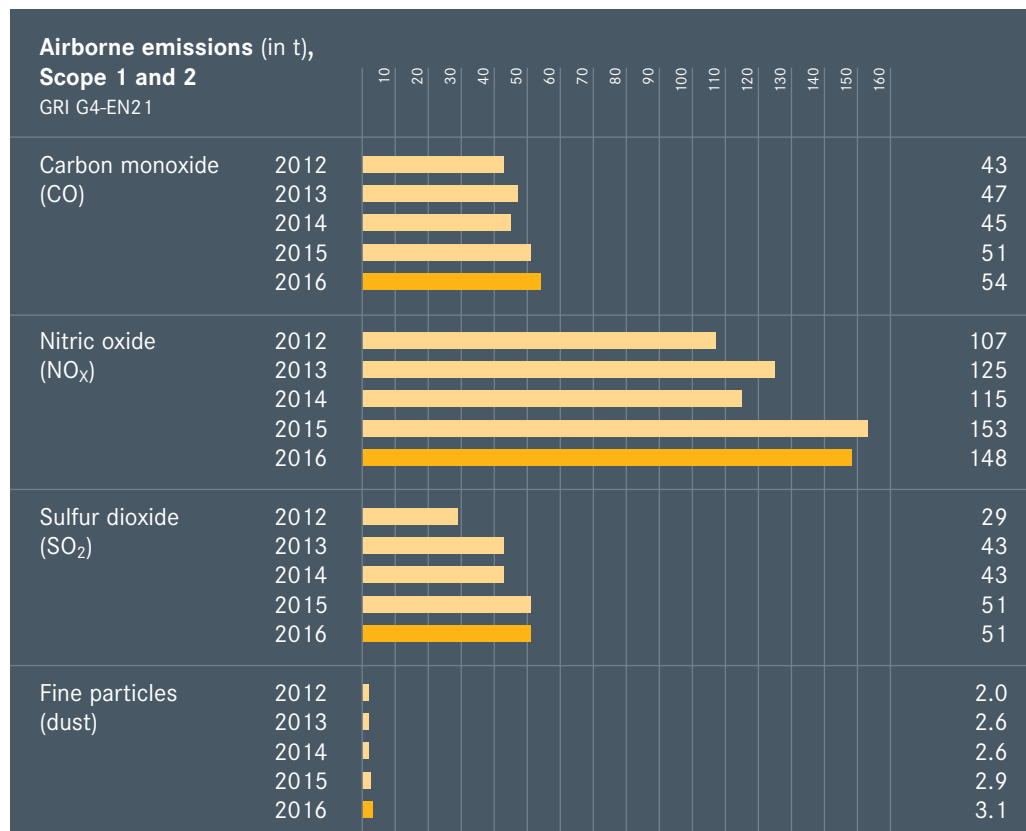
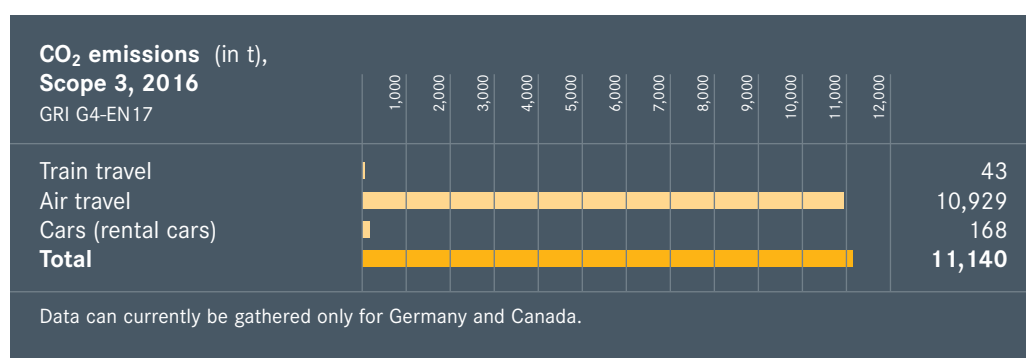
What is MTU's contribution?

With CLAIR-IS (Clean Air-Industrial Site), we have already set a fixed goal to reduce CO₂ emissions at our Munich site by 25 percent over 1990 levels by the year 2020. Under the Climate Pact, we plan to pursue additional measures to achieve further CO₂ savings. We already made good progress in 2016 by introducing energy-saving solutions during periods of low production, optimizing the use of well water, replacing ventilation systems and by modernizing lighting and windows. We have even more planned for 2017 to save a further 5,500 metric tons of CO₂.

Airborne emissions (GRI G4-EN21)

The use of energy is responsible for not only CO₂ emissions but also further airborne emissions. The use of kerosene, natural gas, electricity and district heating from fossil fuels causes the emission of carbon monoxide, nitric oxide, sulfur dioxide and dust, which we also determine. In 2016, ab-

solute emissions of air pollutants in the atmosphere totaled 256 tons. We aim to reduce these emissions, too, for example by using new filters for plasma spraying (dust emissions).



Production sites only

2012: Germany, 2013-2015: Germany and Poland, 2016: fully consolidated MTU Group

Adjusted figures following standardization of emission factors for the MTU Group

Emission factors may vary significantly from one location to another, especially in regard to electricity and district heating. We therefore use reliable estimations: see explanation in the GRI Index in the annex.

3.4 Water (GRI G4 DMA Water and DMA Effluents and Waste, G4-EN8-9, 22, 24)

Water is a vital natural resource for industry and society in general. Accordingly, we protect water sources and use water efficiently in the manufacture and repair of our products. We also strive to minimize our consumption of water.

We use drinking water for production and repair processes and in sanitary facilities and in the cafeteria. We use well water for cooling processes. In 2016, the production sites of the MTU Group required a total of 7.1 million cubic meters of water (2015: 7.4). Of this, 2.2 percent was drinking water, compared with 97.8 percent groundwater. MTU increasingly uses Quaternary groundwater extracted from its own on-site wells in Munich. The higher consumption of drinking water of 153,343 cubic meters in 2016 (2015: 147,555) is a result of the expanded group reporting entity including the additional production site in Vancouver, Canada.

We have effective water management systems in place at all production sites. The production sites in Europe and Canada are not located in water-stressed regions, which are regions in which water is a scarce resource.

We use recirculated water as much as possible in chemical process baths for applying protective coatings to blades and also for the process water in installations for testing component damage. In this way, we are able to reuse large volumes of water and have to treat only a small amount of waste water before discharging it into the municipal sewers. This enabled us to save around 644,620 m³ of water in 2016. Our sustainable water management also includes a systematic inspection and renovation of the well water and sewer canal networks.



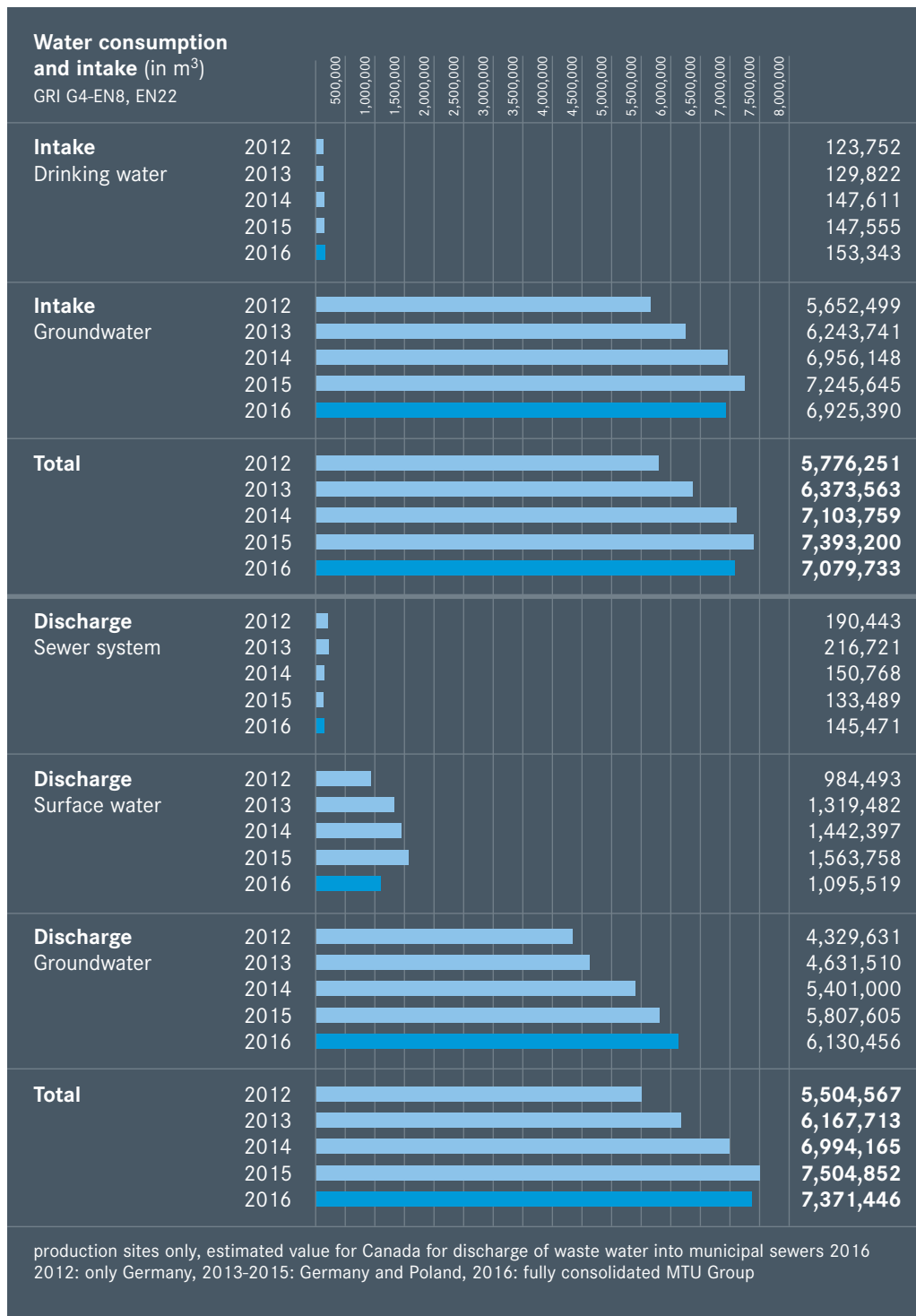
In its production processes that use water, MTU is careful to ensure efficient consumption.

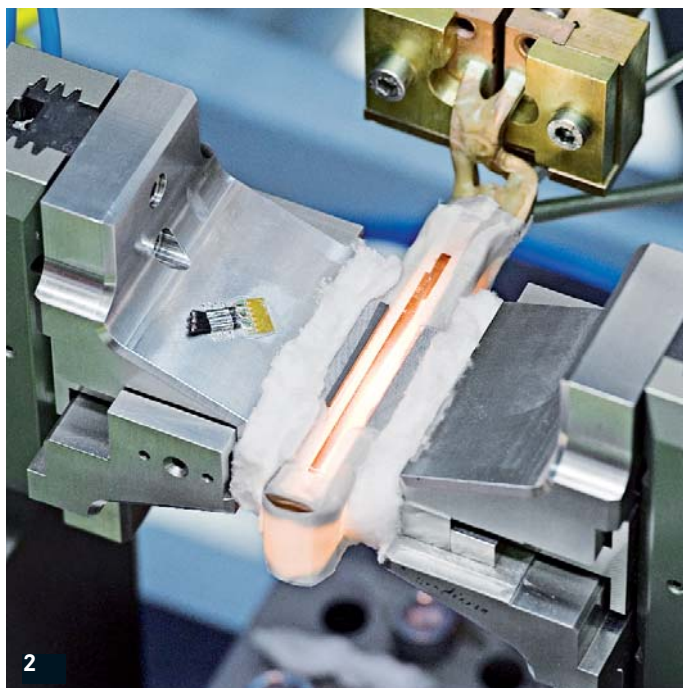
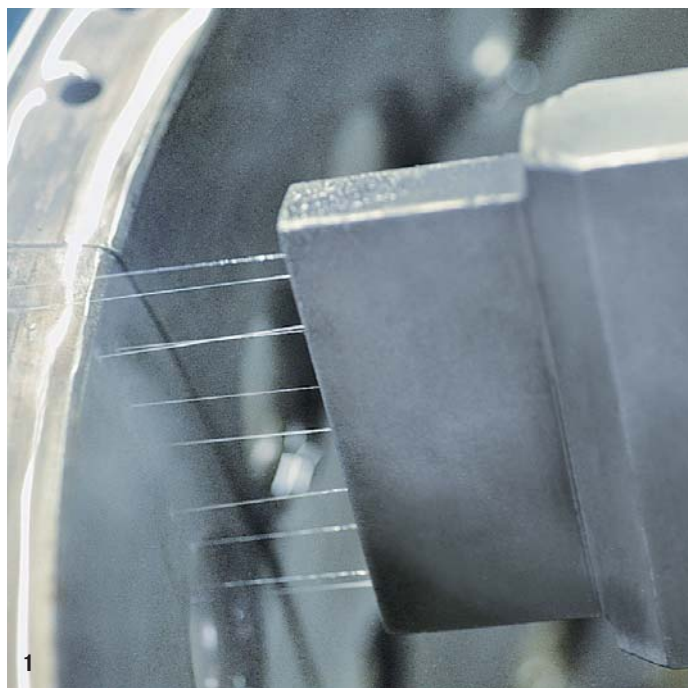
Water quality

(GRI G4-EN9, 24)

MTU treats waste water in suitable sewage systems according to the type and extent of pollution. The quality of the discharged waste water complies with the official permits issued for the respective location. Strict monitoring at the sites ensures that legal limits are observed. Neither water sources nor water surfaces are negatively impacted or polluted by our operating activities. This also applies to our site in Canada, which is located directly on the Fraser River in Richmond, British Columbia.

The concentration of VHH (volatile halogenated hydrocarbons) in the groundwater at the Munich site in 2016 was well below the limit of ten micrograms per liter, coming in at 1.2.





1 Using a water jet to remove coatings is a stripping process that offers particularly high material efficiency.

2 Inductive high-frequency pressure welding involves joining airfoils to the disk by welding rather than milling blisks from the solid.

3 Additive manufacturing is a completely new technique that enables the fast production of components with no excess material.

3.5 Material efficiency and waste

(GRI G4-DMA Materials and DMA Effluents and Waste, EN1, 23-25, 28)

MTU uses raw materials and other materials sparingly in production and maintenance. In all of our methods, we pay attention to efficiency and seek to avoid waste.

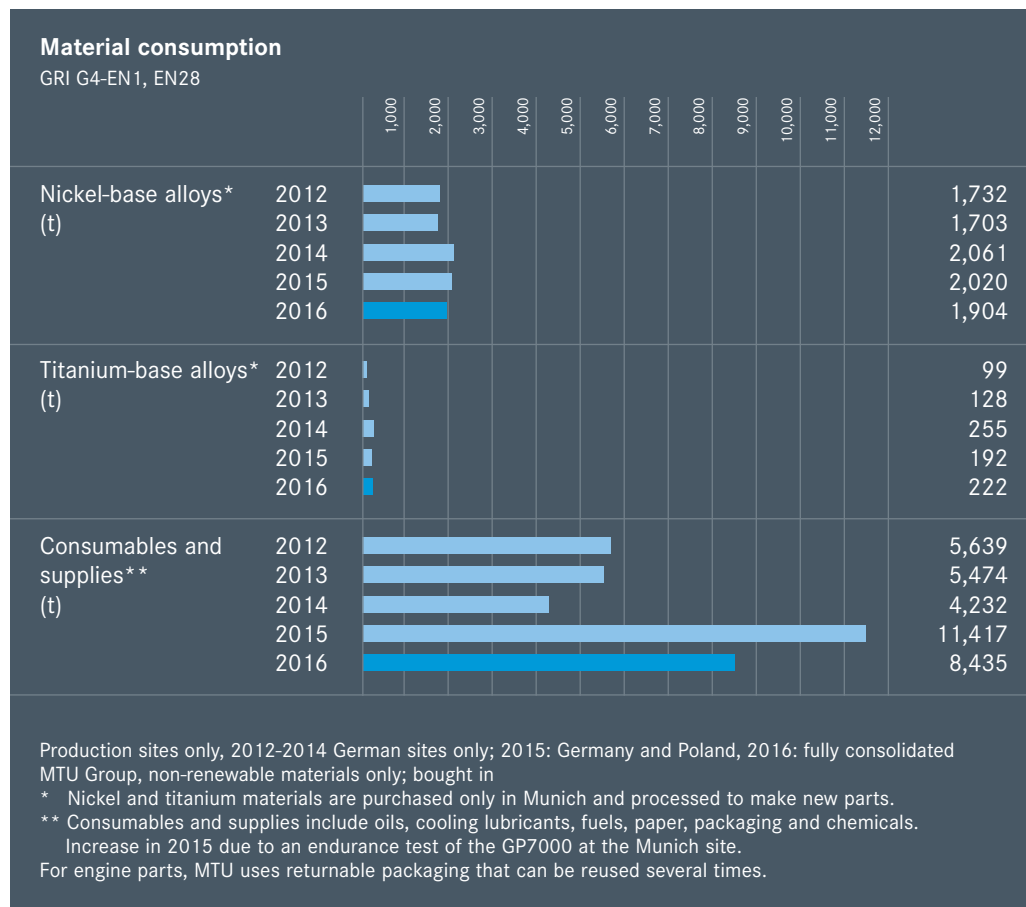
MTU develops its own production and repair methods that are characterized by their high material efficiency, such as:

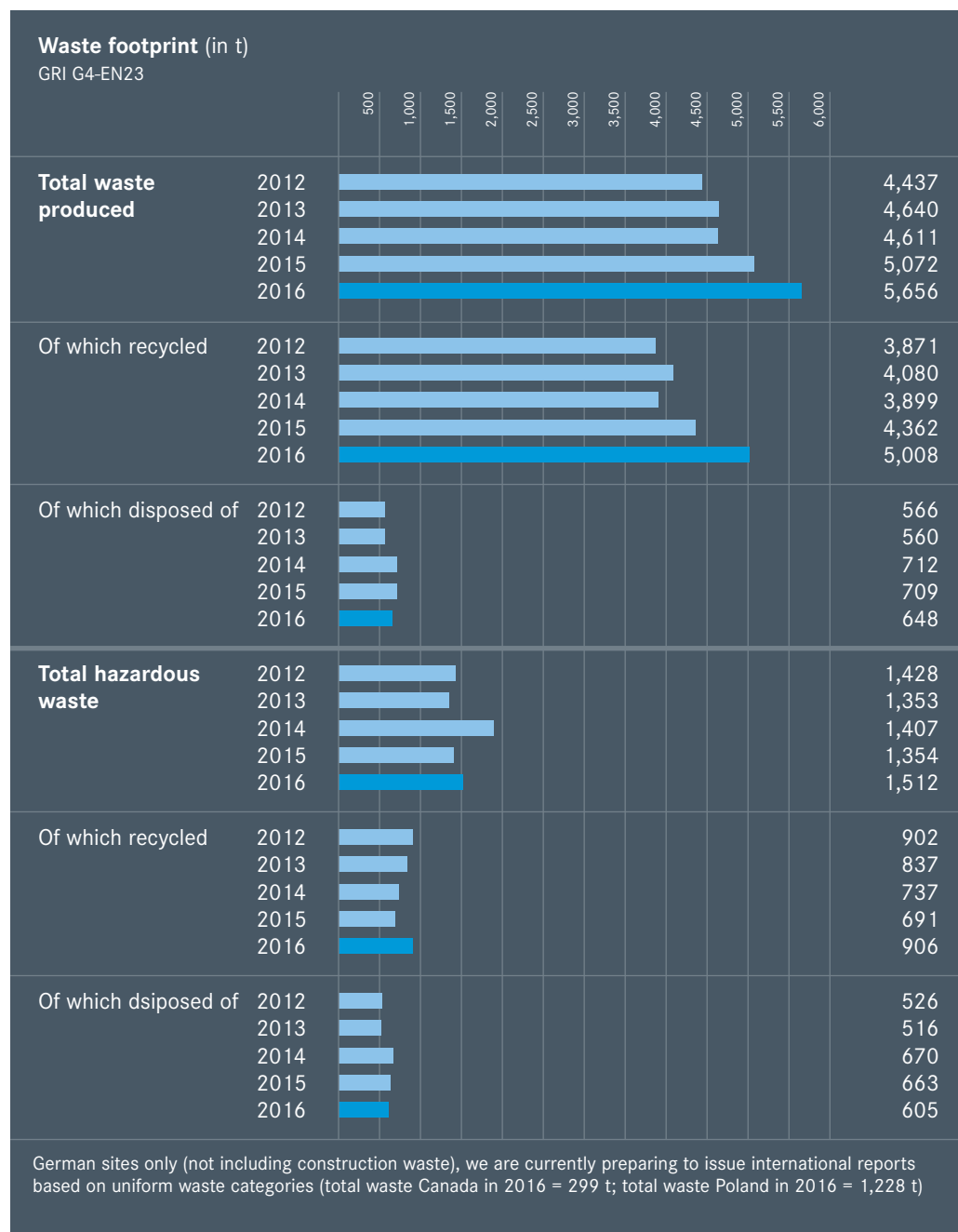
- Stripping coatings by means of water jet
- Laser and electron beam melting
- Inductive high-frequency pressure welding

Additive manufacturing

MTU has exploited the new 3D printing technology in a way that shows great promise for engine construction. This additive manufacturing method permits the rapid 3D production of highly complex components. Components are laser-melted

directly from a powder bed according to CAD data—with no excess material. This significantly reduces the amount of resources used. MTU is already producing its first production components using additive methods for the new Geared Turbofan™ programs and is continuously refining the method to gradually expand the range of components.





REACH

Wherever possible, we avoid using environmentally hazardous materials in our manufacturing processes and products. According to the European REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) regulation, certain substances of very high concern (SVHCs) containing chromium⁶⁺ are subject to authorization from September 2017. MTU uses chromium trioxide, ammonium dichromate, sodium dichromate and potassium chromate in its pro-

duction processes and has obtained the requisite authorization in line with the 2016 ECHA (European Chemicals Agency) regulations. In a project to implement the REACH regulation, we are pushing ahead with the long-term elimination of SVHCs that require authorization, insofar as possible, either by replacing them or by rejecting new authorizations. MTU is duly implementing all provisions of the EU regulation for protecting employees and the environment. We communicate the REACH requirements to the suppliers of

our various sites in our General Terms and Conditions of Purchase (> see 2.7 Responsibility for the supply chain).

Waste management/recycling

(GRI G4-EN23-25)

MTU practices sustainable waste management with the safe disposal waste sorted according to waste type and recycling process. As our chief priority, we try to avoid waste in the first place. Leftover materials are reused, while waste is used either for its materials or as energy; if recycling is not possible, waste is properly disposed of. In this way, we seek to minimize material consumption and waste disposal volumes. We achieve a high recycling rate.

The total amount of waste produced in the reporting period was 5,656 tons. Of this, we recycled 88.5 percent and disposed of only 11.5 percent. The amount of waste produced and recycling routes are dependent on production capacity utilization and on building activities. The share of hazardous waste in the reporting period was 26.7 percent (2015: 26.7 percent).

No soil contamination was found to result from MTU operating activities in 2016.

Product recycling

With its “repair beats replacement” philosophy, MTU Maintenance achieves a truly impressive depth in aircraft engine repair. Using special techniques the company has developed in-house, we repair engine components that in other maintenance shops would have to be replaced with new parts. Our high levels of material efficiency mean that we conserve resources. Around 70 percent of all engine blades can be given a second, third or even fourth lease on life. We are constantly adding new product recycling techniques to our repertoire (> see 2.6 product quality and safety).



We separate waste, as seen here in production at MTU Aero Engines Polska, and dispose of it appropriately.



4 Employees and Society

MTU's employees drive the company's success, providing the ideas, skills and motivation that keep us moving forward. As a high-tech manufacturer and a long-established player in the industry, we are committed to offering long-term, sustainable employment in an attractive working environment. We give our employees the opportunity to develop themselves personally and professionally and provide them with the skills they need to deal with the changing world of work. We fully acknowledge our social responsibility to our employees and to society as a whole.



Main GRI aspects covered by this chapter:

- | | |
|--|--|
| ■ Organizational profile (total workforce) | ■ Equal remuneration for women and men |
| ■ Employment | ■ Labor practices grievance mechanisms |
| ■ Labor/management relations | ■ Non-discrimination |
| ■ Occupational health and safety | ■ Freedom of association and collective bargaining |
| ■ Training and education | ■ Human rights grievance mechanisms |
| ■ Diversity and equal opportunity | |

4.1 Management approach: employment

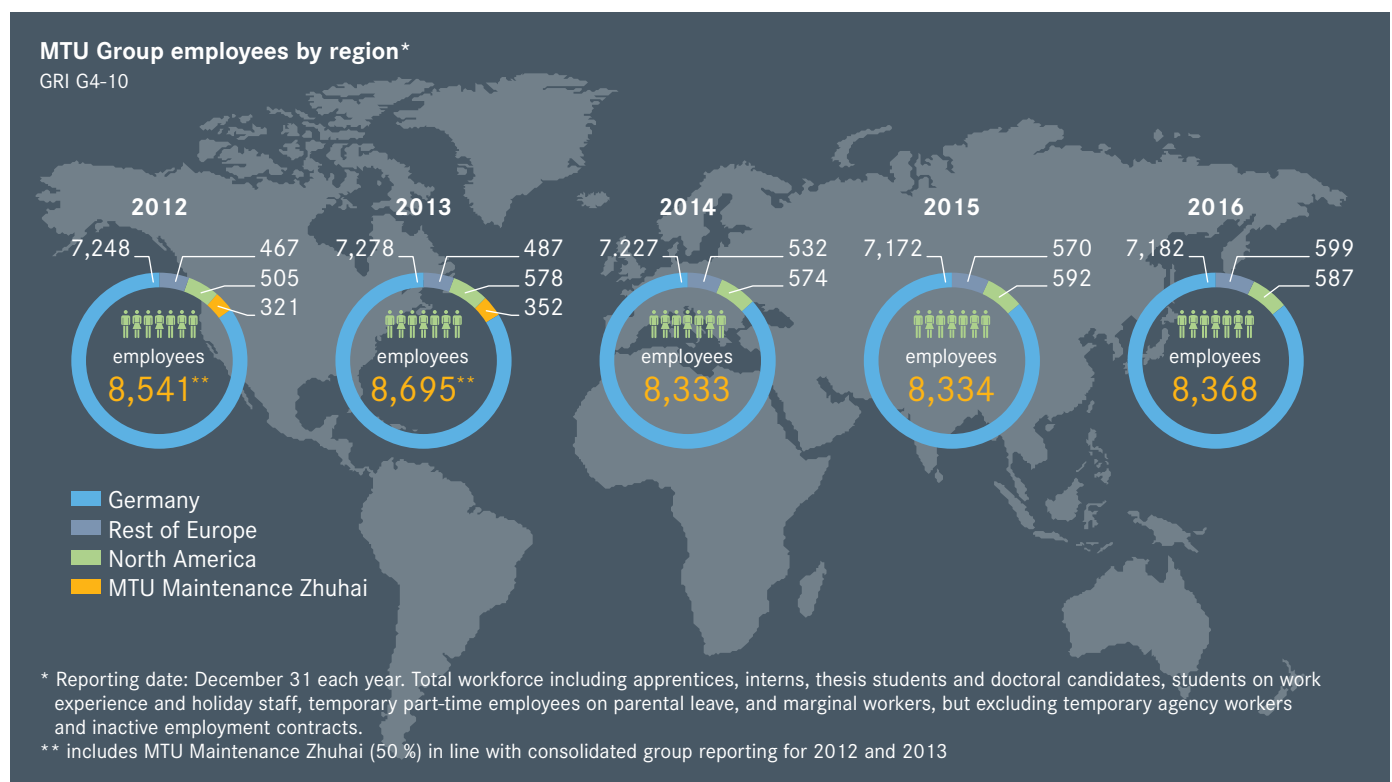
As of the end of fiscal 2016, MTU had 8,368 employees (without Asia) on its books, with the vast majority (93 percent) employed in Europe, 85.8 percent of whom work in Germany. Seven percent of the company's workforce is employed in North America. The company's headcount was slightly up on the previous year, rising by 0.4 percent (2015: 8,334). Viewed over a five-year period, MTU's headcount has remained steady at over 8,300 employees.

Based on a materiality analysis, we have identified the following points as our primary focal points in terms of our responsibilities as an employer:

- Human rights
- Attractiveness as an employer
- Occupational safety
- Employee training and development
- Health management
- Diversity
- Work-life balance
- Demographic change

We prioritize the issues that both the company and the stakeholders consider to be the most important (> see 1.1 Materiality matrix and analysis), namely human rights, attractiveness as an employer, and occupational safety. Employee-focused issues boost our added value almost exclusively within the group, though they also play a key role outside the group in terms of their impact on MTU as an employer brand.

Responsibility for employment issues lies with the Executive Board. The CEO is also the Director of Labor Relations. MTU's human resources center sets policy in line with the annual and long-term growth targets laid down in our corporate strategy. It also assists in efforts to achieve these targets. All members of the Executive Board receive regular reports on human resources policy. Responsibility for successful implementation lies with local human resources departments and the respective technical departments and managers. Our human resources policy takes into account cultural differences at our various sites. We integrate all our employees in day-to-day working life at MTU, regardless of culture, gender, physical abilities or age group. This sustainability report marks the first time that we have



provided an overview of all MTU's fully consolidated sites worldwide, and it allows us to demonstrate what makes MTU so diverse.

We regularly adapt our human resources policy to reflect changes in the underlying parameters and are constantly developing and enhancing the measures and initiatives derived from this policy. We respond in a timely and appropriate manner to the challenges posed by digitalization, globalization, flexibilization, and the increasing median age of the population in Western industrialized nations (> see interview in the section on our attractiveness as an employer). We are fully engaged with the key topics of digitalization, leadership and health. In 2017, we incorporated digitalization as one of our corporate objectives, reflecting the fact that we are expanding our skills and platforms in a number of interdisciplinary projects in order to meet the latest requirements.



MTU operates internationally, with subsidiaries in Rocky Hill (1), Connecticut, U.S.; Amsterdam (2), the Netherlands; Vancouver, Canada (3); and Rzeszów, Poland (4).

Employee structure by region					
GRI G4-10					
	2012	2013	2014	2015	2016
Blue collar workers					
Germany	47.5%	48.5%	49.4%	49.7%	49.2%
Rest of Europe	—	51.8%	51.4%	49.9%	46.5%
North America	—	—	—	—	52.5%
White collar workers					
Germany	52.5%	51.5%	50.6%	50.3%	50.8%
Rest of Europe	—	48.2%	48.6%	50.1%	53.5%
North America	—	—	—	—	47.5%
Information on the proportion of women by employment type and employment contract is treated as confidential at MTU. 2012: Germany only, 2013-2015: Germany and Poland, 2016: fully consolidated MTU Group					

Employee structure GRI G4-10, LA12	2012	2013	2014	2015	2016
Total workforce	8,541	8,695	8,333	8,334	8,368
Of which employees on temporary contracts					
Germany	254	249	198	164	177
Rest of Europe	—	—	30	45	47
North America	—	—	—	—	9
Of which apprentices					
Germany	328	343	381	345	311
Of which students on work experience/holiday staff					
Germany	178	172	164	181	200
Rest of Europe	—	49	28	19	25
North America	—	—	—	—	6
Of which internships*					
Germany	243	247	237	218	205
Rest of Europe	—	—	—	—	1
North America	—	—	—	—	0
Supervised workers					
Germany	—	—	—	332	395
Rest of Europe	—	—	—	0	7
North America	—	—	—	—	0
2012: Germany only, 2013-2015: Germany and Poland, 2016: fully consolidated MTU group. We have been collecting data on supervised workers since 2015. Information on the proportion of women by employment type and employment contract is treated as confidential at MTU. *Internships: interns, thesis students and doctoral candidates					

The employee survey provides important impetus for the company's ongoing development. It gives employees the opportunity to play an active role in shaping their working environment. We carry out surveys at regular intervals at our German sites, in Poland, in Canada and in the US. The results are analyzed in workshops, enabling teams to develop measures to implement in their specific areas. A monitoring system is in place to ensure the sustainability of this process. In 2016, our German sites worked on faster decision-making processes, higher quality leadership, and improved collaboration between different teams and locations. These were the key topics that emerged from our analysis of the survey toward the end of 2015. To ensure changes are firmly embedded during follow-up work on the survey results, a team consisting of upper management from the three German locations analyses priority areas for action at a corporate level and offers recommendations on how to improve MTU in the future.

Social and labor standards

MTU creates fair working conditions throughout the organization by laying down clear standards. A group-wide Code of Conduct (<http://www.mtu.de/company/compliance/code-of-conduct/>) defines the benchmarks of our responsibility as an employer:

- Observance of human rights
- Equal opportunities in the workplace
- No discrimination in industrial relations
- Constructive cooperation with employees, employee representatives and labor unions
- Entitlement to equitable pay
- Protection of occupational health and safety
- Employee training and development

Above all else, we believe that fair working conditions include the absolute rejection of forced or child labor and the protection of human rights. We are a participant in the UN Global Compact (<https://www.unglobalcompact.org>), and we are committed to observing its principles of respect for human rights and the implementation of fair working conditions in accordance with the International Labor Organization's (ILO's) core labor standards. (> Code of Conduct, Chapter 1.2, Ethics and integrity)

In Germany, the General Act on Equal Treatment (German abbreviation: AGG) prohibits discrimination against employees. In line with the provisions of this Act, every site in Germany has a designated contact person who is appropriately trained. For employees in Germany there are also internal guidelines on fair and cooperative conduct that are designed to prevent bullying, sexual harassment and discrimination. In these guidelines, MTU undertakes to punish violations with appropriate measures.

Defined processes have been established to deal with reported breaches of the Code of Conduct, the General Act on Equal Treatment, or internal guidelines. Employees who suspect illegal activities can contact an ombudsman confidentially. Managers, the works council, and members of the human resources department are also designated as contact persons in this context. We use internal communications to provide information on reporting channels. When they join the company, new employees are informed about the regulations laid down in the Code of Conduct and—in Germany—in the General Act on Equal Treatment, and they undertake to comply with these requirements. In addition, we provide regular training on the Code of Conduct at all the company's sites and across all hierarchical levels. During the reporting period we ran 383 days of training on legal issues for 1,656 participations in Germany.

Once again, there were no breaches of the Code of Conduct in 2016 and no cases of discrimination were encountered. There were also no complaints under the General Act on Equal Treatment at our German sites.

We are committed to respecting employees' rights and safeguarding their freedom of association through the Code of Conduct. When drafting employment contracts, we observe national statutory requirements as well as internal company agreements and notice periods as laid down by law. It is the duty of managers to ensure that company agreements are properly observed on a day-to-day basis in their areas of responsibility. In 2016, 98 percent of the people employed in Germany were by the company were covered by collective agreements, a figure that stood at 85.8 percent world-wide in the same year.

We believe in offering secure, long-term forms of employment. The rate of staff turnover stood at 4.3 percent for the group as a whole in the

Staff turnover 2016 GRI G4-LA1	Germany	Rest of Europe	North America
New employees, total*	193	59	52
of which temporary	79	40	3
of which male	133	42	44
of which female	60	17	8
of which younger than 30*	61	9	21
of which aged between 30 and 50*	50	11	24
of which older than 50*	3	1	7
No. of employees that left the company	253	18	48
Turnover rate (%)**	4.1	3.2	8.4
* New external entries, not yet adopted			
** as a proportion of core workforce (Germany) and core workforce plus temporary (US)			

reporting year, a figure that indicates long-term employee loyalty and satisfaction with MTU as an employer.

Dialog with our employees

We take into account our employees' concerns by consistently fostering an atmosphere of trust and respectful collaboration. In accordance with the German Works Constitution Act (Betriebsverfassungsgesetz), MTU's sites in Germany have works councils that maintain regular, open and trust-based dialog with management. The German sites have a group works council that handles group-related issues. At the company's international sites in Poland and Canada, elected employee representatives support the interests of the workforce in dealings with management. In addition, the interests of employees are represented on the supervisory board, where seats are filled on the basis of parity.

Furthermore, there are well-established forums for promoting the involvement of specific groups of employees. These include information events for managers and for employees not covered by collective agreements, as well as employee meetings in Germany and town hall sessions with employees in the US. The company also employs specialist feedback tools in the form of leadership feedback and the Team Barometer, which gauges the mood within a team and helps to develop the way teams and managers work together. Our ideas management system takes up suggestions for improvement made by the workforce and coordinates the evaluation and implementation of these suggestions.

4.2 Occupational health and safety

We have comprehensive measures in place to promote occupational safety and employee health. These measures help us maintain the long-term productivity of our employees, an issue that is of particular significance for our German sites in the face of demographic change.

Worldwide, we place a great deal of importance on the safety and health of our employees. Occupational safety and employee health are enshrined in our Code of Conduct, the MTU Principles, and our business processes. High standards in occupational safety are also one of our annual corporate objectives. Compliance with national statutory regulations on occupational safety is a mandatory minimum standard for all international MTU subsidiaries. Occupational safety officers are appointed at management level for each of the company's production sites. Local technical departments take action on occupational safety issues on site. Our occupational safety systems are regularly reviewed and improved, and a number of them are certified externally in accordance with international standards such as Occupational Health and Safety Assessment Series (OHSAS) 18001 (<http://www.mtu.de/engines/quality/approvals-certifications/>). 97.5 percent of the MTU Group's total workforce was represented on local health and safety committees in 2016 (> GRI G4 index in annex).

Our occupational safety systems include advising and supporting managers and employees, safety training, first aid training, workplace risk assessments, ergonomic assessments, and the provision of safety equipment in the workplace. They also include assessments for planning new workplaces, measurements and advice regarding noise problems in the workplace, evaluations of hazardous materials, and advice on compliance with the REACh regulation. Managers are expected to provide a positive role model for occupational safety, and employees are encouraged to play an active role.

We aim to permanently reduce the number of accidents and reach a level of safety that aspires to prevent any accidents whatsoever (zero-accident vision). In 2016, the group-wide accident rate was 5.8 per 1,000 employees. All accidents were recorded, evaluated and investigated. Our analysis did not reveal any accident hotspots. In addition, the company has a system in place to record near-misses at all production sites. Since

Occupational safety GRI G4-LA6	2012	2013	2014	2015	2016
Reportable workplace accidents					
Germany	24	13	26	31	35
Rest of Europe	-	0	1	1	1
North America	-	-	-	-	7
Fatal industrial accidents					
	0	0	0	0	0
Days lost as a result of reportable accident					
Germany	807	273	542	551	550
Rest of Europe	-	0	21	22	18
North America	-	-	-	-	38
Accident rate per 1,000 employees					
Germany	3.9	1.9	2.1	5.0	5.6
Rest of Europe	-	0	2	1.8	1.8
North America	-	-	-	-	12.2
2013-2015: rest of Europe not fully consolidated (only Poland), 2016: fully consolidated MTU Group Workplace accidents do not include any commuting accidents, nor accidents that entail more than three days lost (not counting the day of the accident). In order to protect personal data, no further statistical analysis is carried out concerning accidents and days lost. Further distinctions based on gender are therefore neither possible nor intended. MTU has no figures on the number of illnesses that were accepted as being work-related following the application process. Accident statistics are based on Book VII of the German Social Code. Accidents involving temporary agency workers in 2016: 2 (MTU Group excluding Hannover)					

2014 we have unfortunately seen an increase in accidents in Germany, particularly at our headquarters in Munich. We therefore intend to launch a comprehensive occupational safety initiative at the site. We will be running a similar campaign at MTU Maintenance Canada in Vancouver where the EHS statistic in 2016 did not achieve expected targets. All accidents and their causes were thoroughly investigated and appropriate steps were taken to prevent their recurrence.

We are continually carrying out prevention work at our sites. The local technical departments regularly report on important occupational safety issues and promote safe behavior through campaigns to raise awareness. These include monthly safety training sessions for shop-floor employees in Hannover, Berlin and Vancouver.

Occupational safety initiatives in 2016

- HSE (Health/Safety/Environmental) Day, Berlin
- Case of the Month, Munich
- Walks of Safety, Rzeszów
- Prevention of back injuries, Vancouver

Health management

We systematically promote the health of our workforce with a clear emphasis on prevention. If we can keep our health rate stable despite an aging workforce, then we can consider our approach to have been successful. In 2016, our health rate in Germany was 94.4 percent.

Maintaining people's employability and ability to perform is crucial during periods of demographic change. For this reason we have launched a corporate health management system and developed a series of key internal performance indicators, initially for Germany. These indicators are designed to help us develop health promotion projects and tools in a timely manner. The focus of health management is increasingly shifting toward mental health and the conditions required to promote healthy lifestyles.

We take a continuous improvement approach toward health management. Our health index for Germany, which was derived for the first time from the 2015 employee survey, offers insights into how well employees cope with their work within the framework of their working environment. It also gives an indication of whether a team's working environment is conducive to good health or whether it could cause psychological stress. Every manager receives recommendations for targeted measures that can be taken together with the team to maintain people's ability to work. Pilot projects have also been launched to carry out enhanced risk assessments with a

focus on physical health in the workplace. In addition, we support managers through our specially developed "Health-Oriented Leadership" training program. This was carried out in a selected area of the company in Munich in 2016 and is now being offered to all managers at the site.

Health services at the German sites cover occupational and emergency medicine as well as general preventive medicine. Counseling services offer employees support with performance and work-related issues as well as mental health issues. Additional benefits offered by MTU include fitness studios at our German sites, which are run either in-house or by external partners, as well as physiotherapy, training in ergonomic seating, health days for different divisions/departments, and on-site vibration training. All our German locations provide employees and managers with access to occupational health professionals (in-house and external) as well as social counselors and supplementary in-house and external services. Our sites outside of Germany offer a range of health-related services. In Canada and in Rocky Hill (USA), for example, employees have access to an "Employee Assistance Program" that offers a wide variety of health and counseling options on topics such as financial planning, mental health, and personal or family counseling, as well as advice on equipping workplaces in a way that promotes good health.

Germany stipulates legal requirements for Workplace Reintegration Management (Betriebliches Eingliederungsmanagement, BEM). Within this context, we aim to help employees overcome whatever difficulties may prevent them from working in order to help them retain their job. In 2016 we launched a pilot project on the shop floor of our Munich headquarters focusing on systematic ergonomics management. The goal is to adapt workplaces to Germany's ageing workforce, primarily by reducing strain on the musculoskeletal system.

Selected health initiatives and services in 2016

- Skin cancer screening (Munich)
- Awareness-raising event aimed at developing inner strength (Munich)
- Vaccination check-up (Hannover)
- Hearing campaign (Rzeszów)
- Hearing tests and flu shots (Vancouver)
- Monthly health tips based on the season (Rocky Hill)

4.3 Attractiveness as an employer

Being perceived as an attractive employer by existing and potential employees is one of the key ways in which MTU bolsters its innovative capabilities and competitiveness. We have a variety of offers designed to help our employees achieve a healthy work-life balance, and we are responding to their changed expectations about having personal control over the way their work is structured.



Like so many other companies, we are competing for the best employees. This competitive environment is just as evident at our international sites in Canada and the U.S. Being perceived as an attractive and future-oriented employer is therefore important for all international MTU subsidiaries. Internal employee surveys and external rankings offer valuable pointers as to whether our recruiting and HR processes are heading in the right direction. In comparative analyses with other companies, MTU has received consistently positive ratings. This is reinforced by the fact that MTU regularly receives awards ranking it as a top employer in Germany, Poland and British Columbia, Canada (<http://www.mtu.de/careers/work-at-mtu/awards/>). We also regard our low staff turnover rate of just 4.3 percent in this reporting year as yet another sign of high employee satisfaction.

Certifications and rankings in 2016

- TOP Employer Germany
- TOP Employer Poland
- TOP Employer British Columbia (Canada)
- trendence Graduate Barometer Engineering (33rd place)
- Universum Ranking (29th place)
- Chief Learning Officer
- Top Company on Kununu

Remuneration and additional benefits

(GRI G4-LA2, LA11)

The right to appropriate remuneration is one of the pillars of MTU's Code of Conduct. A standardized, transparent compensation structure ensures that employees receive competitive remuneration that reflects their performance. The remuneration of pay-scale employees in Germany is based on collective bargaining agree-



Representatives from MTU Aero Engines' Polish site attend the TOP Employer Polska 2016 award ceremony.

ments. Compensation for senior managers is tied to the company's long-term performance and was converted to the same system as the Executive Board compensation structure at the beginning of this reporting year.

MTU applies a consistent methodology for evaluating performance at all levels of the hierarchy. The performance criteria are based on corporate, center or departmental objectives and are designed to measure how employees and managers contribute to reaching these objectives. All managers undergo performance reviews to evaluate achievement of their personal targets. 96.7 percent of MTU employees worldwide regularly receive an evaluation of their performance (at least once a year).

MTU offers a broad range of additional perquisites. One example is the range of social benefits the company offers in Germany in addition to its statutory obligations. These include accident insurance, profit-sharing, family-related and mobility benefits, a healthcare service and disability cover. The company has a pension scheme for all its employees. At our international locations we offer a range of additional benefits such as private life insurance and health insurance or retirement saving accounts. In fiscal 2016, the company made social contributions totaling 102.6 million euros.

MTU enables its employees to share in the company's success. This profit-sharing scheme is made available in Germany and is defined in special rules for each employment group. We offer an employee stock option program at our locations in Germany. In 2016, the take-up rate was 27 percent and 145 million euros were invested. Some of our international locations offer their own long-term bonus schemes, such as Rzeszów in Poland.

Hans-Peter Kleitsch, Senior Vice President, Human Resources at MTU Aero Engines, responds to three questions on the changing world of work



How is the world of work changing?

"The world of work is currently undergoing a fundamental transformation. The key issues are demographic change, digitalization, globalization, and a shift in societal values concerning career aspirations, identities and attachments."

What does that mean for employers?

"As an employer, we need to respond to those changes. Our strategy for human resources management is to address these developments in a timely manner. To do that, we have defined five key spheres of activity based on our operating environment, which comprises the markets, society as a whole and our internal requirements. The five areas we have chosen to tackle are flexible work systems, establishing a clearer definition of management behavior including for virtual teams, building on our strong position as an employer, optimizing our workforce for the future, and expanding digital processes."

What concrete steps is MTU taking to prepare for this transformation?

"Let's take the example of digitalization. We are pursuing a group-wide digitalization strategy that encompasses each and every area of MTU. One of our key tasks is to empower our employees, and that's where our "Work 4.0" digitalization initiative is making great strides. We are bringing the concept of lifelong learning up-to-date, making it more effective and, above all, more personalized. The virtualization of work is on the rise, and that means we need to create the right framework of IT and communication platforms and, even more importantly, adapt management behavior to meet this challenge."

Achieving a better work-life balance (GRI G4-LA3)

MTU promotes initiatives to improve employees' work-life balance and is placing an increasing emphasis on responding to their specific needs and various life phases. These initiatives include:

- Flexible working hours and flextime accounts
- Over 50 models of part-time employment
- Educational leave
- Teleworking
- Sabbaticals
- Phased retirement
- Parental leave
- Job sharing
- Services to assist families (e.g. childcare, nursing services)
- Mobile working

We are continuously improving these initiatives to give people more job flexibility and meet the expectations of our stakeholders, especially our employees and job applicants. Alternative working arrangements are already a reality at our company. In 2015 and 2016, we ran a pilot project in selected departments at our Munich

location to gain practical experience with mobile working. Our goal was to lay solid foundations for greater autonomy and personal responsibility among MTU employees. In 2017, we made this model available to all our employees at the Munich location through a corresponding works agreement.

In 2016, part-time work accounted for 5.4 percent of employment throughout the MTU Group (6.4 percent in Germany). 3.9 percent of employees in Germany were on parental leave in 2016; as a proportion of the overall workforce, these were predominantly men. The return rate and number of people remaining in their posts after parental leave is very high for both mothers and fathers. In 2016, the return rates were 91.7 percent for mothers and 99.4 percent for fathers. The number of people remaining in their posts at MTU twelve months after returning from parental leave stood at 86.8 percent for mothers and 98.6 percent for fathers.

Alternative working arrangements GRI G4-10	2012	2013	2014	2015	2016*
Part-time employees (in %)					
Germany	6.2	6.1	6.8	7.5	6.4
Rest of Europe	—	0	0	0	0
North America	—	—	—	—	0.5
* Not comparable with previous year's figures due to changes in workforce reference values 2013-2015: rest of Europe not fully consolidated (only Poland)					

Parental leave GRI G4-LA3	2015	2016
Employees on parental leave (male)	159	184
Employees on parental leave (female)	92	97
Employees returning from parental leave in reporting year (male)	146	177
Employees returning from parental leave in reporting year (female)	38	44
Employees who returned from parental leave in previous year and are still employed 12 months later (male)	125	144
Employees who returned from parental leave in previous year and are still employed 12 months later (female)	36	33
We have been collecting these figures for Germany since 2015. The right to parental leave applies to the entire workforce in Germany and is governed by the German Parental Allowances and Parental Leave Act. This stipulates that anyone employed in Germany has a right to time-off, regardless of their gender.		

4.4 Employee development (GRI G4-LA9-11)

Qualified and motivated employees are indispensable in our technically demanding and innovation-driven industry. That's why we make it a priority to offer our employees a wide range of opportunities and avenues for personal development, as well as offering comprehensive support. This starts with the training of our own recruits.

One of the key principles of corporate social responsibility defined in our Code of Conduct is to provide our employees with appropriate training for the jobs they do. In 2016, we applied this principle by investing a total of 3.7 million euros (2015: 2.8 million euros) and 22,324 training days (2015: 18,889) in employee training. The increase over previous years is due to the expanded scope of consolidated group reporting. On average, employees took part in about three days of training and development in 2016. The senior vice president of human resources is responsible for the training and development of employees group-wide, and reports directly to the CEO. We consider qualified and motivated employees to be the basis for long-term business success. For this reason we facilitate high-quality training and development opportunities throughout an employee's entire career as part of a framework of life-long learning. For example, MTU Maintenance Canada offers an innovative range of training and development programs that clearly sets it apart from its competitors (TOP Employer British Columbia). As part of our digitalization campaign, we aim to provide our employees with the development opportunities they need to meet new standards and take advantage of new opportunities. The Collaboration & Communication project is working on incorporating new tools in an integrated IT platform in order to improve digital collaboration and com-



Competent and motivated employees are the key to our success, which is why we facilitate high-quality training and development opportunities.

munication. The company is also developing a new online learning portal.

All employees have access to employee training and career development programs. In Germany these are provided through the fixed framework of our "campus" training scheme. Employees can access the campus course schedule through the central platform of the intranet. Management is required to conduct an interview with each employee once a year to discuss their training and development.

Employee training GRI G4-LA9	2012	2013	2014	2015	2016
Training days (total)	23,801	21,507	20,012	18,889	22,324
Training days per employee	3.4	2.7	2.5	2.3	2.7
Proportion of men on training schemes*				85 %	85 %
Proportion of women on training schemes*				15 %	15 %
Investment in training (EUR million)	4.2	3.3	2.4	2.8	3.7

Investment in training does not include travel costs, 2012: Germany only, 2013-2015: Germany and Poland, 2016: fully consolidated MTU Group
MTU assumes the costs of training and development programs.
* Employees who participated in training schemes (includes multiple counts), compiled from 2015 using the sustainability database, Germany only

Leadership

Meeting the challenges that lie ahead requires strong leadership. Developing leadership skills is therefore one of the key priorities of our human resources policy. We help managers improve their leadership skills through a variety of management training programs and communication forums. Leadership style is governed by the leadership guidelines laid down in the MTU Competences, which are derived from the MTU Principles. A leadership guide for managers in Germany serves as an in-house knowledge database.

We place a major emphasis on achieving a consistent understanding of leadership and ensuring that leadership is effective. This reporting year saw the continuation of our 2014 Business Challenge training program in the form of the “MTU Business Challenge II Leadership” initiative, which involved all MTU managers worldwide. Its goal is to promote consistent leadership practices and a culture of feedback and dialog, as well as making leadership more efficient.

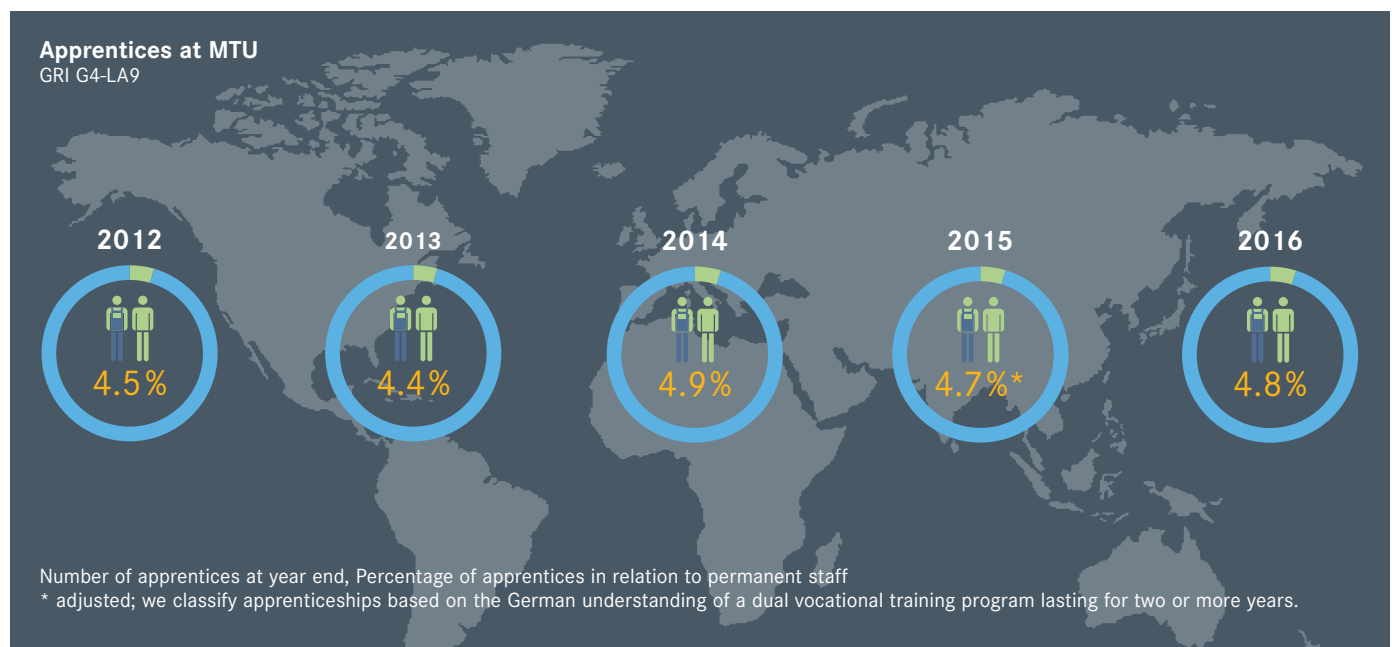
In addition, individual locations have launched leadership initiatives tailored to their specific on-site requirements (e.g. the Future Dialog discussions as part of the RESPONSE program in Hannover, the management development program in Berlin, and Management Growth in Rzeszów).

The increasing digitalization of our economies and societies is transforming what we expect from managers. We need to be prepared for the challenges that lie ahead and help managers exploit the opportunities that digitalization offers for our company. The “Business Challenge II Leadership” initiative that came to an end in late 2016 helped managers get to grips with key digitalization issues and created an opportunity to discuss them with colleagues. Towards the end of 2016, the Executive Board and upper management also participated in an in-house digitalization summit.

Concepts are currently being developed for a “Business Challenge III Leadership” initiative which is due to take place in 2018.

Management training

- Business Challenge
- Building on Talent
- International Building on Talent
- International Leadership Program
- MTU Management Growth (Rzeszów, Poland)
- RESPONSE Future Dialog (Hannover, Germany)





Employees from the Engineering Rotation Program at MTU Aero Engines North America. Over a period of 18 months, they rotate through a variety of departments focusing on a different area of aerospace engineering.

Training and apprenticeships

We offer young people in Germany a solid grounding in eleven trades. In addition to providing professional qualifications, their training also encompasses methodological, social and environmental issues. Apprentices have made up a large percentage of MTU's workforce for many years. In 2016 they accounted for 4.8 percent of the total workforce in Germany, where our apprenticeship schemes are run. There were 311 apprentices employed at the company at the end of 2016.

MTU is actively involved in numerous local educational projects and initiatives that aim to attract potential recruits early on and introduce them to science and technology professions. These initiatives include:

- Training Night
- IdeenExpo science exhibition in Hannover
- Nature and Technology Days
- Long Night of Museums
- Teachers in Industry
- Work placements for high school students, taster weeks
- Patronage of selected schools
- Special events for future female talent (Girls' Day, etc.)
- EUROTECH

We believe in fostering personal as well as vocational development, which is why we also organize annual environmental and health promotion days for apprentices and encourage them to get involved in local community programs.

Talent Management

The age structure of MTU's workforce in Germany reflects demographic changes in the overall population. We need to prepare to fill a large number of skilled and managerial positions over the coming decade. Since 2016, our talent management process has been identifying people with the potential to assume key roles and supporting them through personalized development programs. The primary focus is on succession planning for positions that are critical to our company's success.

The company has also introduced other initiatives aimed at preserving valuable expertise and experience. These include:

- a know-how buddy system
- exchange of expertise with the aid of knowledge maps
- wikis

The challenge we face at our U.S. engineering facility in Rocky Hill is how to retain talented employees and help them grow.

4.5 Diversity and equal opportunities

At MTU, we give all our employees an equal opportunity to get involved in our work. We also promote diversity in the workforce to give MTU the best prospects for the future.

Demographic change, globalization and a shift in values are making diversity more important than ever. MTU deploys and supports all employees in accordance with their skills, abilities and performance. Everyone has the same opportunities regardless of their gender, age, ethnic origin, religion, disability, or sexual orientation. To promote even greater diversity in its workforce, MTU actively encourages collaboration between employees of different generations, genders, cultures and countries, including employees with disabilities. Diversity enhances our capacity for innovation and contributes to the competitiveness and long-term success of our business.

MTU's Code of Conduct explicitly commits the company to equality of opportunity and equal treatment of all employees. The Compliance Board monitors adherence to these principles on a group level. No cases of discrimination were reported during the reporting period (see section on social and labor standards in this chapter). Promoting diversity is a key component of our corporate culture that is enshrined in our MTU Principles. Moreover, promoting a diverse and international workforce has been one of our annual corporate objectives since 2016.

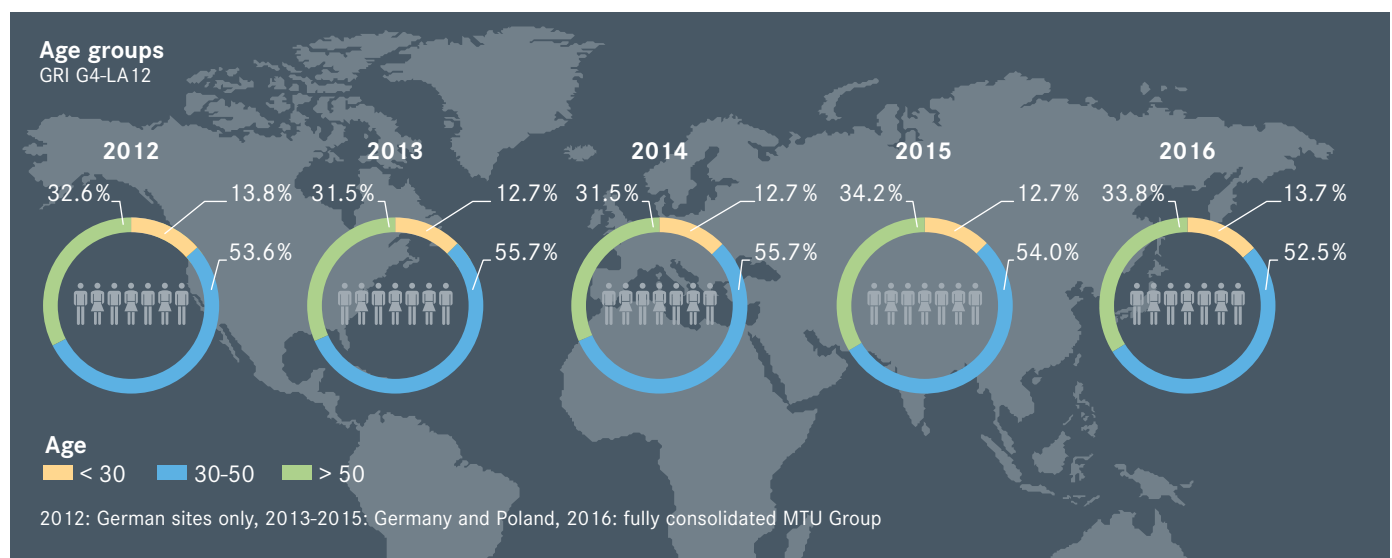
(> detailed information on diversity in our Executive Board and Supervisory Board can be found in our 2016 annual report, p. 34f.).

Our commitments

- Charter of Diversity
- UN Global Compact
- Munich Memorandum for Women in Management

Managers have a key role to play in recognizing the value of diversity and incorporating it into everyday working life at MTU. We help them spearhead effective changes in their own sphere of responsibility in order to reinforce diversity and exploit its benefits to the full.

We regard the promotion of each individual's employability as a key tool for dealing with demographic change. This includes the integration of employees with disabilities. In 2016, disabled employees represented an average of 5.1 percent of the workforce at MTU's German locations, which are subject to statutory requirements.



Cultural diversity

Our international orientation is not only an expression of diversity, but also an inherent trait of the global engine business. People from 48 nations work together at MTU's German locations. In line with our corporate objective, we are taking various steps to enhance the international nature of our business (International Leadership Program, International Building on Talent). And by employing local employees at our worldwide locations, we add to the cultural diversity of the group as a whole. We employ predominantly local staff and managers at our sites in Rzeszów (Poland), Rocky Hill (USA), Alpharetta (USA) and Vancouver (Canada).

As a global company, we encourage new recruits to spend time working abroad even before they finish their apprenticeship, traineeship or dual vocational training program. They are given the opportunity to take part in international exchange programs with partners or work on international project assignments within the MTU Group.

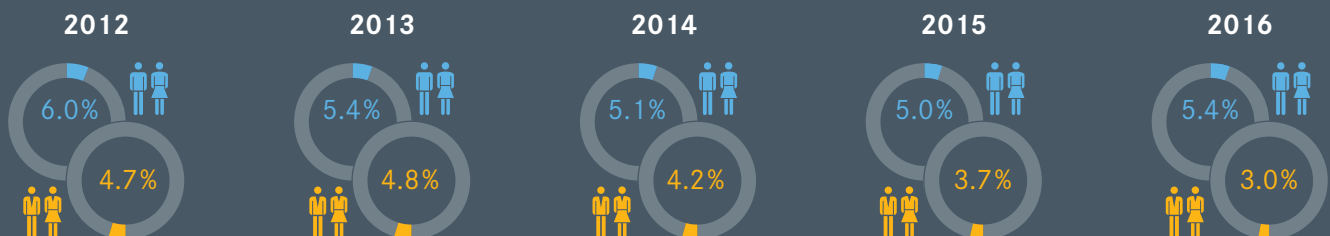


As a globally operating company, we promote a diverse and international workforce. Pictured here is our site in Vancouver.

Nationalities

GRI G4-LA12

Total workforce ■ Managers ■



Foreign staff as a percentage of the workforce, 2012: Germany, 2013-2015: Germany and Poland, 2016: German locations only, it is currently not possible to consolidate figures for the entire MTU Group due to legal restrictions in other countries.

Gender diversity (GRI G4-LA12/13)

We consider the notion of equal opportunities for men and women to be self-evident. We firmly believe in the principle that people should receive equal pay for equal work. Remuneration levels and promotion prospects are determined solely by the job to be performed and the employee's skills and abilities. Under no circumstances do they depend on the employee's gender. We carry out regular studies to review people's remuneration at virtually all the MTU Group's international subsidiaries. In some countries, such as Canada and the U.S., we are legally required to produce annual reports on the company's salary structures.

MTU has committed itself to increasing the proportion of female employees at all levels of the company in order to make better use of talent and innovation potential in the face of demographic change and other developments. 1,070 women were in active employment at MTU at the end of 2016, representing 14 percent of the total workforce. The company had 89 female managers out of a total of 833 at the end of the year. The proportion of female apprentices was 15 percent.

The principal focus of our initiatives and employer branding is to secure more female talent for the company and offer female employees greater support throughout their careers through mentoring programs and career advice. For example,

MTU's talent management program focuses on women in management. We also run an internal mentoring program.

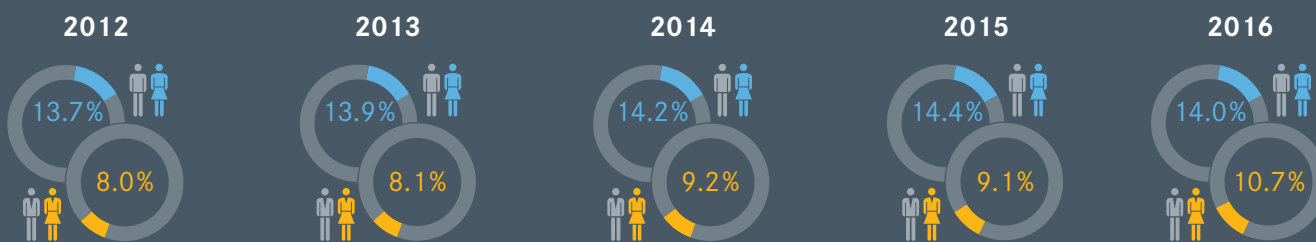
In 2016, MTU participated in the Women's Career Index for the first time, taking second place in the "Newcomer of the Year" category.

**Proportion of women**

GRI G4-10, LA 12

Proportion of women

Proportion of women in management positions



Figures recorded at the end of each year. No figures are available on the number of women in specific employee groups. 2016 not comparable with previous year's figures due to changes in workforce reference values.

2012: German sites only, 2013-2015: Germany and Poland, 2016: fully consolidated MTU Group

For more information on quotas for women and target agreements for the Executive Board and Supervisory Board, please consult our 2016 annual report, p. 34f.



We want to increase the percentage of our workforce that is female. In 2016, women accounted for 14 percent of employees.

Our programs and initiatives

- Munich Memorandum for Women in Management
- Cross-Mentoring Munich (a program organized by the city of Munich)
- Internal mentoring program
- Talent Management
- The MTU “Studienstiftung” foundation for female students in scientific and technical fields

- Girls’ Day
- Research Camp for Girls
- The Lower Saxony Technical Internship (“Niedersachsen Technikum”)

We actively support gender equality through programs to promote a healthy work-life balance, which are constantly being reviewed and improved.

4.6 Corporate Social Responsibility

Our commitment to society focuses on research and education, an approach that reflects our reliance on new generations of well-trained employees and an innovation-friendly business environment in our quest to drive forward aviation technology. We support the social fabric of the places in which we operate through a combination of donations and sponsorship.

Corporate social responsibility is an integral part of the MTU Principles. We contribute to social development as a major regional employer and training provider, offering a wide variety of jobs and apprenticeships in an attractive, high-tech environment. Long-term employment is our priority. In addition to training and developing our employees, we invest in the ongoing development of our plants. We also strive to strengthen MTU's image as a responsible corporate citizen.

We are committed to two key aspects of corporate social responsibility:

- Corporate citizenship
- Donations/sponsorship

MTU regards corporate citizenship as a social responsibility with a clear focus on education, science and research. In terms of donations and sponsorship, we support local and regional projects near our sites as a promoter, sponsor and network participant.

Corporate citizenship

As a research-focused company, our concept of corporate citizenship revolves around science and engineering initiatives. We seek out interaction and collaboration with the world of science and research and foster dialog with young people and new talent.

Education is hugely important for a society's prosperity and its ability to meet future challenges. We are committed to providing open access to training opportunities, which we believe should first and foremost provide our own young employees with a solid grounding in their chosen profession. In 2016, there were 311 young people enrolled on apprenticeship schemes at MTU. We provide training where it is needed most, pursuing a holistic approach that includes the acquisition of professional qualifications as well as methodological competence and social skills. We involve our apprentices in all aspects of com-

pany life including health, environmental protection, social values and our no-blame culture as well as organizing special open-door and awareness events. In addition, MTU participates in numerous educational projects and initiatives for children and young people, striving to enhance people's understanding of technology and sustainability in society as a whole.

Integration of refugees

We took steps to assist with the integration of refugees during the reporting period. This is a task that confronts society as a whole, and we recognized that the best way for us to start was to provide our in-house training staff with the skills they need to address this issue. Since May 2016, we have been accepting refugees on work placements where we help prepare them to meet the challenges of day-to-day working life. We also support refugee centers through donations.

Research cooperations

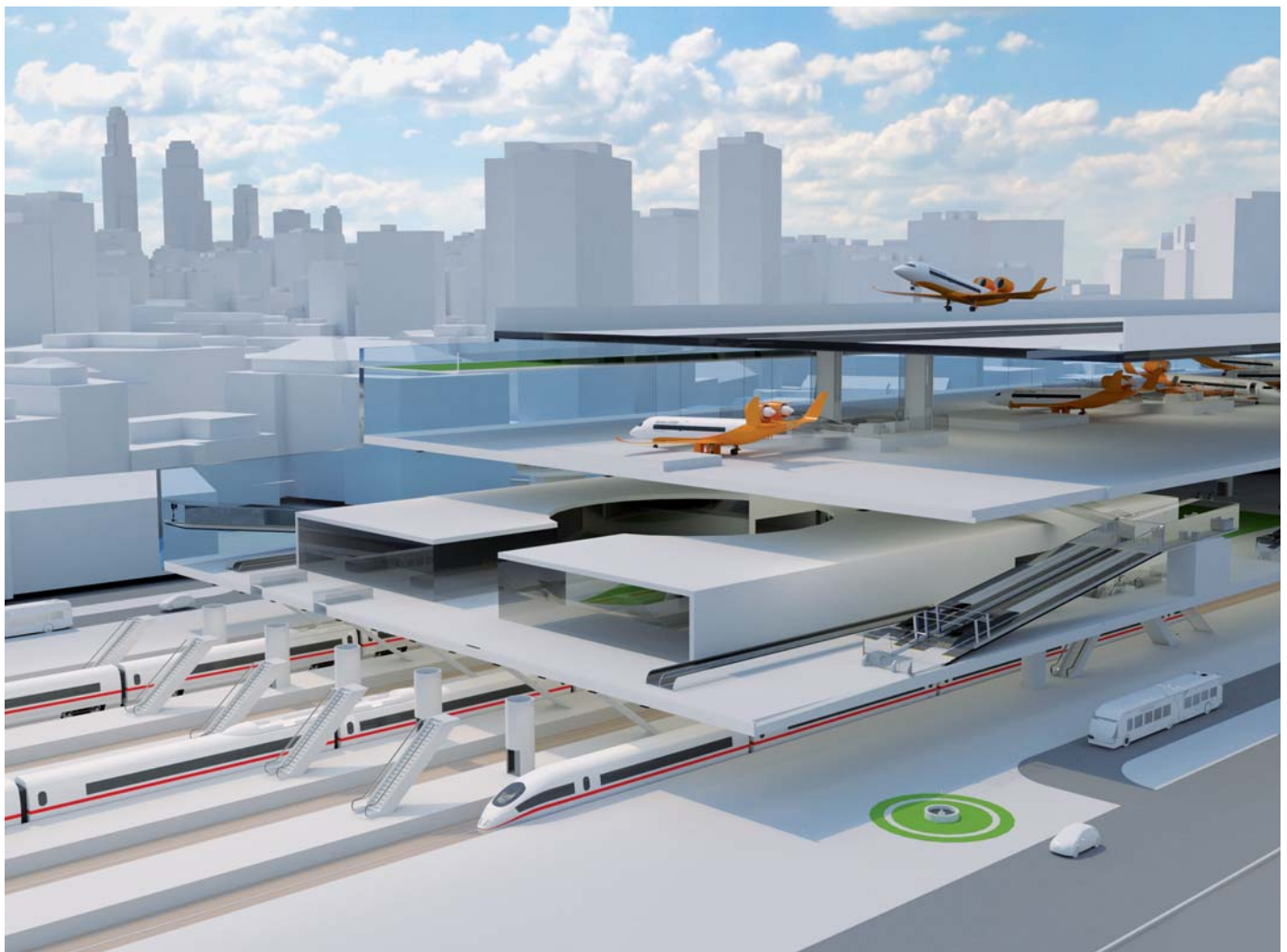
Collaborating with universities and research institutes is a mainstay of our research and development work and a key part of fulfilling our responsibilities to society. We have built strategic alliances with research partners to foster links between universities and industry and safeguard MTU's capacity for innovation. MTU runs six centers of competence in collaboration with universities across Germany, each with its own research focus. In 2005, MTU and its partners founded Bauhaus Luftfahrt e.V., an interdisciplinary aerospace research institute. We run a series of sponsorship schemes at the University of Stuttgart and the German Aerospace Center which support young researchers for a number of years after they finish university, and we provide financial backing for a Deutschlandstipendium, or "Germany Scholarship", at the Leibniz University of Hannover. Our international locations also work together with selected universities and colleges in their communities.

We run a company-affiliated foundation to support highly talented young women studying scientific and technical disciplines in Germany. As well as providing financial grants, the MTU “Studien-Stiftung” offers personal advice and mentoring to help students get started on their careers.

MTU research experts give regular presentations and guest lectures at universities, and we provide a significant proportion of the lectures for the engine technology course at Cottbus. MTU has endowed a chair for aircraft engine structural mechanics at the University of Stuttgart. We also give national and international university groups an insight into how an industrial company works. Students can write dissertations at MTU

as well as bachelor's, master's and doctoral theses. They can also work at the company in a part-time or intern role during their studies. At the end of 2016, there were 437 students working at the company as part of their undergraduate or postgraduate program, on work experience or as holiday staff.

Each year, the company confers the Wolfgang Heilmann science award for outstanding achievements by talented young students in the field of aircraft engines. We are also an industry sponsor of a prestigious German award for aerospace journalism which is awarded annually to non-specialist journalists for outstanding articles on aerospace trends and issues.



Bauhaus Luftfahrt, a think tank co-founded by MTU, presents its vision of how mobility might look in the future.

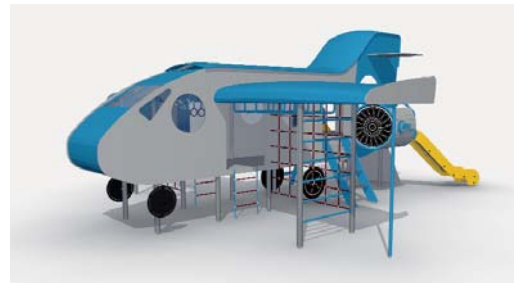
Donations/sponsorship (GRI G4-EC1)

MTU supports various social institutions. These are generally charitable organizations, preferably with a social focus, to which we provide assistance in the form of financial or in-kind donations. A key factor in selecting recipients is a local/regional connection or a thematic link to our business. We prioritize specific projects over general institutional funding. These are selected and implemented independently by the MTU subsidiaries concerned on the basis of careful research. The granting of donations and sponsorship is governed by internal guidelines. A centrally managed clearance and approval process ensures that the rules are adhered to.

In 2016 we dedicated resources to almost 70 projects and institutions in local communities close to our locations

Examples of our social commitment in 2016

- Funding of the parent-run daycare initiative TurBienchen e.V., Munich
- Sponsorship of childcare during school vacations, Munich
- Off-site deployment of MTU's company fire department and doctor, Munich
- "Die Arche" (The Ark)—a project devoted to improving the lives of children in Potsdam, near Berlin
- Fun run for the Healthy Children network, Berlin
- Clinic Clowns, Hannover
- Irene children's home, Hannover
- Children's Day, Rzeszów
- Kidney Foundation of Canada, Vancouver

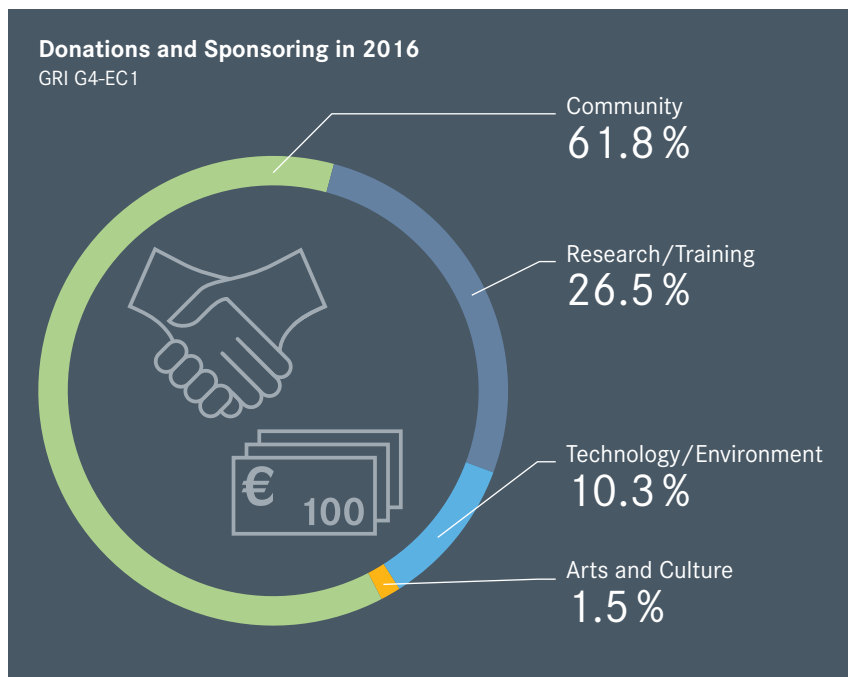


Toy aircraft model destined for the play area in the new recreational and training center in Rzeszów.

We welcome efforts on the part of our employees to take part in voluntary social events such as charity runs and to support the preservation or improvement of social institutions. In Rzeszów, Poland, 38 employees volunteered to assist with the construction of a public educational and leisure center for children in this reporting year. In addition, MTU allows staff to undertake projects with the German Federal Agency for Technical Relief during their paid working day, and offers the services of lay justices for labor tribunals and social justice courts and examiners for the Chambers of Industry and Commerce.



Volunteers at MTU Aero Engines Polska: In 2016, 38 employees in total helped build a public recreational and training center for children.



Goals set and achieved in 2016

(relating to the reporting period)

Strategy/Economy

	Goal	Status/Deadline	Comments
Dialog with stakeholders	→ Direct contact by email for questions on sustainability	Ongoing	
	→ Conduct stakeholder survey on relevant topics and on MTU's achievements and communication strategies in regard to sustainability	Ongoing	Feedback from the stakeholder survey is incorporated in our annual materiality analysis
	→ Prepare non-financial reporting in accordance with the German CSR Directive Implementation Act	Fiscal 2017	Fiscal 2017 is the first year in which the company is required to prepare a non-financial statement. Preparations began in late 2016 on various issues.
	→ Boost dialog with employees about sustainability	2017	Sustainability action day at the Munich site, more articles on the topic in employee media
	→ Evaluate and enhance the stakeholder survey on the MTU website	Ongoing	
	→ Reinforce sustainability aspects of stakeholder dialogs on established platforms (see report, p. 15)	Ongoing	
	→ Participate in an investor conference with a focus on sustainability	Achieved	
	→ Exchange more information with partners on sustainability issues	Ongoing	
Compliance	→ Conduct regular compliance audits to ensure business processes comply with statutory requirements and guidelines	Ongoing	
	→ Carry out employee training	Ongoing	We carried out relevant training courses in Germany and Poland during the reporting year. A new round of Code of Conduct training is scheduled for 2020.
	→ Carry out review of compliance system	2017	
Sustainability management	→ Conduct materiality analysis to determine the most important sustainability topics	Annual	Focused on the whole MTU group for the first time in the 2016 reporting period
	→ Launch CR training for employees	Achieved	Training events were held for employees from the purchasing departments and at Campus
	→ Consolidate CR training for employees	2017	Training is to be continued as part of the Campus training scheme
	→ Achieve inclusion in the Dow Jones Sustainability Index	Not achieved	We will make another attempt to join the DJSI in 2018
	→ Participate in sustainability ratings	Ongoing	
	→ Expand to include additional locations outside Europe	Achieved	All the fully consolidated sites of the MTU Group have now been integrated
	→ Consolidate sustainability topics in the risk management process	2017	
	→ Review CR management processes	2017	Focus on data collection and documentation
	→ Approve key reporting topics of non-financial statement	2017	MTU will submit a non-financial statement for fiscal 2017 by the statutory deadline
	→ Tailor reporting to the materiality concept of the CSR directive	2017	Relating to non-financial statement

	Goal	Status/Deadline	Comments
Sustainability management	→ Involve the Supervisory Board	2017	Starting in fiscal 2017, the Supervisory Board is responsible for approving the non-financial statement as per statutory requirements
	→ Expand knowledge sharing between different regions	Ongoing	UN Global Compact conferences, round table discussions, Munich Business Climate Pact
Supplier management	→ Conduct annual survey of all relevant suppliers on compliance with Dodd-Frank Act	Ongoing	For 75% of the consolidated group
	→ Require new suppliers to commit to the Code of Conduct	Ongoing	For 75% of the consolidated group
	→ Place greater emphasis on environmental aspects in supplier approval process	2017	
	→ Standardized assessment of risks in the supply chain	2017	

Product Responsibility

	Goal	Status/Deadline	Comments
Climate strategy	→ Achieve a 15% reduction in CO ₂ emissions with first generation of Geared Turbofan™ (as compared to the year 2000 engine)	2015-2020	Stage 1 of our climate strategy concluded with the entry into service of the first generation of the Geared Turbofan™ (Claire 1). All the engine models will be rolled out into large-scale production by 2020.
	→ Achieve a 25% reduction in CO ₂ emissions with the second generation of the Geared Turbofan™ (as compared to the year 2000 engine)	2030	Implementation of the second stage (Claire 2)
	→ Achieve a 40% reduction in CO ₂ emissions with an integrated ultra-efficient engine concept	2050	Implementation of the third stage (Claire 3)
Aircraft noise	→ Achieve an 11-decibel reduction in noise emissions (per aircraft movement, corresponds to a drop of 55 % compared to the year 2000) with the second-generation Geared Turbofan™	2035	As per requirements stipulated in the European Strategic Research and Innovation Agenda (SRIA)
	→ Achieve a 15-decibel reduction in noise emissions (per aircraft movement, corresponds to a drop of 65% compared to the year 2000) with the third-generation Geared Turbofan™	2050	As per requirements stipulated in the European Strategic Research and Innovation Agenda (SRIA)
Alternative fuels	→ Support the introduction of sustainable fuels with MTU engine expertise through participation in research projects, studies and practical tests	Ongoing	
Product quality and safety	→ Successfully complete monitoring and recertification audits for quality management systems	Ongoing	

Environmental protection

	Goal	Status/Deadline	Comments
Reduced consumption of energy and resources	→ Reduce CO ₂ emissions by 25 % at the Munich site as part of Clean Air Industrial Site (benchmark year:1990)	2020	
	→ Participate in the Munich Business Climate Pact	By 2017	MTU will take various measures to help large companies in Munich achieve the goal of reducing CO ₂ emissions
	→ Participate in the City of Munich's energy-saving initiative	2017	
	→ Promote sustainable mobility	Ongoing	A concept has been developed to promote e-mobility among employees in Hannover. MTU is planning to participate in the City of Munich initiative to promote e-mobility in 2017
	→ Launch a zero emission campaign	2017	Munich
	→ Carry out employee training courses on sustainable resource consumption and the company's environmental activities	Ongoing	
	→ Reduce the environmental footprint and CO ₂ emissions of business travel by making increased use of modern communication technologies such as phone and video conferencing	Ongoing	
Measures to save energy	→ Reduce the amount of energy required to power buildings	Ongoing	
	→ Upgrade to LED lighting	Ongoing	
	→ Switch off machines and systems during extended interruptions to operations	Ongoing	
	→ Improve the efficiency of compressing air	Ongoing	
	→ Use groundwater for cooling	Ongoing	Munich
Material efficiency	→ Sustainable manufacturing concepts: apply new laser-based additive manufacturing techniques to build production parts straight from the powder bed based on CAD data	Ongoing	The range of parts is continuously being expanded. New parts were successfully introduced in 2016.
	→ Material development: improve materials by making them lighter and more resistant to extreme temperatures, resulting in lower fuel consumption and pollutant emissions	Ongoing	
Use of materials	→ Implement the EU REACH regulation	2017	We are on target to meet the deadline.
Environmental certification	→ Certification to ISO 14001 and validation under the Eco-Management and Audit Scheme (EMAS)	Ongoing	Hannover and Berlin sites are certified to ISO 14001; Munich, Hannover and Berlin sites are validated under EMAS
	→ Extend EMAS validation to all German sites	Achieved	
	→ Annual environmental statements for the German sites to document compliance with EMAS requirements in accordance with Regulation (EC) No. 1221/2009 of the European Parliament.	Ongoing	Since 2016, for MTU Maintenance Berlin-Brandenburg

Employees

	Goal	Status/Deadline	Comments
Occupational safety	→ Limit reportable workplace accidents to a maximum of 18 within the MTU Group (production sites)	Not achieved	Goal not attained due to an unfortunate trend of accidents especially at the Munich location
	→ Extend expanded risk assessment to all German sites	Achieved	
	→ Run a safety at work campaign with key topics	Ongoing	Plans are underway to launch “mission zero” campaign (zero workplace accidents) in Munich and a similar campaign on occupational safety in Vancouver in 2017; assessment launched to determine where we stand in terms of enhancing the safety culture in Hannover
	→ Run surveillance and recertification audits in the MTU Group in accordance with OHSAS 18001 for sites that are already certified	Annual	
Health protection	→ Introduce systemic ergonomics management	Ongoing	To be extended to the MTU Group from 2017 onwards
	→ Promote a healthy diet	Ongoing	
	→ Continue developing workplace reintegration management (BEM) at German sites	2017	Pilot project launched in Hannover in 2016 with systematic involvement of managers in the process. MTU has set up an internal integration committee that includes managers. The company physician service has been expanded to cover workplace inspections, health consultations and networking with external health professionals
	→ Health days replaced by the new active days concept as a health management training initiative	From 2017	
	→ Renovation and re-opening of the company health studio	2016 to 2017	Munich
Attractiveness as an employer	→ Strengthen international focus of employer branding	Ongoing	
	→ Continue developing offers to improve people's work-life balance	Ongoing	
	→ Receive “Top Employer” status in Germany, Poland and British Columbia, Canada	Annual	
	→ Initiatives for company-sponsored childcare during summer vacation	Ongoing	Munich, Hannover
	→ Provide independent advice and facilitation services for family-related matters	Ongoing	The services offered are reviewed and enhanced on a regular basis
	→ Develop new offers to promote employee mobility	Ongoing	Charging infrastructure tests currently underway for employee e-mobility initiative (Hannover)
	→ Successfully complete Mobile Working pilot project	Achieved	Launched in Munich in 2017
Diversity	→ Increase percentage of female employees and women in management positions	Ongoing	
	→ Participate in initiatives designed to promote young female talent, such as Girls' Day and the Research Camp for Girls	Ongoing	

Employees

	Goal	Status/Deadline	Comments
Training and development	→ New training opportunities to promote greater internationalization	Partly achieved	Strengthening of international co-operation thanks to the International Leadership Program (ILP) in 2015, English version of Business Challenge in Hannover in 2016
	→ Continue with Business Challenge training and qualification program	Achieved	MTU Business Challenge II Leadership completed in late 2016
	→ Launch MTU Business Challenge III	2018	The team is currently working on the main focus of the follow-up program
	→ Introduce a new online learning portal for employees to make it easier for staff to update their knowledge in line with their individual learning requirements.	Currently expected to be completed by the end of 2017	
	→ Introduce a talent management process	Achieved	
Employer/employee dialog	→ Company suggestion scheme for putting employees' ideas for improvement into practice	Ongoing	
	→ MTU Award to honor outstanding performance	2017	Every two years
	→ Implement measures based on feedback from the employee survey at the end of 2015	2016/2017	Various measures including information events to communicate MTU goals/strategy, and special issues of employee magazine devoted to key topics

Society

	Goal	Status/Deadline	Comments
Integration of refugees	→ Support integration of refugees in the workplace	Achieved	Since May 2016, we have been accepting refugees on work placements at our Munich headquarters where we help prepare them to meet the challenges of day-to-day working life
Corporate volunteering	→ Support employee volunteer work	Ongoing	In 2016 the company started providing support for the construction of a public educational and recreational center for children in Rzeszów; social day scheduled for managers in Munich in 2017
Investing in young talent	→ Sponsorship schemes for the further training of young scientists after they finish university	By 2018	MTU has signed three sponsorship agreements with the University of Stuttgart and the German Aerospace Center.
	→ Endowed Chair in Structural Mechanics of Aircraft Engines at the University of Stuttgart's Institute of Aircraft Propulsion Systems	Ongoing	The successful candidate took up this post in 2016.
	→ MTU foundation with the goal of actively supporting development of female students in STEM disciplines	Ongoing	
	→ Award Wolfgang Heilmann Prize for young scientists	Annual	
Promote science journalism	→ Sponsor the German award for aerospace journalism	Annual	

GRI-Index – General Standard Disclosures

Strategy and Analysis

GRI-Indicator	UNGC-Principle	Reference/Comment
G4-1	Statement from the Board of Management	Foreword by the Chief Executive Officer p. 5

Organizational Profile

GRI-Indicator	UNGC-Principle	Reference/Comment
G4-3	Name of the organization	Company profile p. 8-9
G4-4	Primary brands, products, and services	Company profile p. 8-9
G4-5	Organization's headquarters	Company profile p. 8-9
G4-6	Countries where the organization operates	Annual Report 2016 p. 61
G4-7	Nature of ownership and legal form	Company profile p. 8 Annual Report 2016 p. 28
G4-8	Markets served	Annual Report 2016 p. 146
G4-9	Scale of organization	Company profile p. 8-9
G4-10	6 Total workforce	4.1 Management approach: employment p. 68
G4-11	3 Percentage of total employees covered by collective bargaining agreements	4.1 Management approach: employment p. 71
G4-12	Description of supply chain	2.7 Responsibility for the supply chain p. 46-47
G4-13	Significant changes regarding size, structure, ownership	none
G4-14	Precautionary approach	3.1 Management approach: environmental protection p. 54
G4-15	External charters, principles, or other initiatives	1.2 Ethics and integrity p. 19 1.3 Compliance and human rights p. 21 2.2 Innovations p. 32 2.4 Climate strategy p. 36 2.5 Flight noise p. 40 3.1 Management approach: environmental protection p. 54 4.5 Equal opportunity and diversity p. 80
G4-16	Memberships	Selection <ul style="list-style-type: none"> • Association of German Engineers (VDI) • Aviation Initiative for Renewable Energy in Germany e.V. (aireg) • Bauhaus Luftfahrt e.V. • bavAIRia e.V. • Chamber of Commerce and Industry for Munich and Upper Bavaria (IHK) • Deutsches Verkehrsforum e.V. (industry association for all modes of transport) • Employers' Associations for the Bavarian Metal-working and Electrical Industries (bayme and vbm) • Enterprise for Health • European Aerospace Quality Group • Federation of German Security & Defence Industries (BDSV) • Forum Luft- and Raumfahrt e.V. (forum for the aerospace industry) • Friends and Sponsors of the Deutsches Museum • German Aerospace Center (DLR) • German Aerospace Industries Association (BDLI) • German Association of Environmental Management e.V. • German Society for Aeronautics and Astronautics (DGLR) • IATA Strategic Partnerships • Münchener Bildungsforum gem. n.e.V. (Munich-based network for employee training and HR development) • Stifterverband für die Deutsche Wissenschaft (sponsors' association for German science) • Trace International, Inc. • UN Global Compact • Vereinigung der Bayerischen Wirtschaft e.V. (Bavarian business association)

Material Aspects and Boundaries

GRI-Indicator	UNGC-Principle	Reference/Comment	
G4-17	Basis of consolidation	About this report	p. 6-7
G4-18	Process for defining report content	1.1 Sustainability strategy and organisation, Materiality analysis	p. 12-13
G4-19	Material aspects identified	Materiality matrix	p. 13
G4-20	Material aspects within the organization	Materiality principle <i>MTU determines the relevance of the major topics along the entire value chain as follows: the relevance of upstream and downstream activities is based on information supplied to MTU by business contacts. We deem any topic to be relevant that plays a significant role in the industry and that has a bearing on MTU's business activities.</i>	p. 101
G4-21	Material aspects outside the organization	Materiality principle	p. 101
G4-22	Re-statements of information	About this report	p. 6-7
G4-23	Changes from previous reports	Extension to all the fully consolidated locations of MTU Group. About this report.	p. 6-7

Stakeholder Engagement

GRI-Indicator	UNGC-Principle	Reference/Comment	
G4-24	Stakeholder groups engaged	1.1 Sustainability strategy and organisation, Dialog with stakeholders	p. 14-16
G4-25	Basis for selection of stakeholders	1.1 Sustainability strategy and organisation, Dialog with stakeholders	p. 14-16
G4-26	Approaches to stakeholder engagement	1.1 Sustainability strategy and organisation, Dialog with stakeholders	p. 14-16
G4-27	Key topics and concerns raised through stakeholder engagement	1.1 Sustainability strategy and organisation, Dialog with stakeholders	p. 14-16

Reporting Profile

GRI-Indicator	UNGC-Principle	Reference/Comment	
G4-28	Reporting period	About this report	p. 6-7
G4-29	Date of previous report	About this report	p. 6-7
G4-30	Reporting cycle	About this report	p. 6-7
G4-31	Contact point for questions regarding the report	About this report	p. 6-7
G4-32	GRI Content Index and chosen option	About this report	p. 6-7
G4-33	External assurance	About this report	p. 6-7

Governance

GRI-Indicator	UNGC-Principle	Reference/Comment	
G4-34	Governance structure	Annual report 2016	p. 24-25 p. 56-57

Ethics und Integrity

GRI-Indicator	UNGC-Principle	Reference/Comment	
G4-56	10	Values, principles, codes of conduct	1.2 Ethics and integrity p. 18-19

GRI-Index – Specific Standard Disclosures

Economics

GRI-Indicator	UNGC-Principle		Reference/Comments
		Economic Performance Management approach	1.4 Sustained value creation p. 24-27
G4-EC1		Economic value generated	1.4 Sustained value creation p. 27 4.6 Corporate social responsibility p. 87 Indicator is not reported by market or region.
G4-EC2	7	Financial implications of climate change	1.1 Sustainability strategy and organization, Risk management p. 17
		Procurement Practices Management approach	2.7 Responsibility for the supply chain p. 46-49
G4-EC9		Proportion on spending on local suppliers	2.7 Responsibility for the supply chain p. 47

Environment

GRI-Indicator	UNGC-Principle		Reference/Comments
		Materials Management approach	3.5 Material efficiency and waste p. 63-65
G4-EN1	7, 8	Materials used by weight or volume	3.5 Material efficiency and waste p. 63
		Energy Management approach	3.3 Energy management p. 55-56
G4-EN3	7, 8	Energy consumption within the organization	3.3 Energy management p. 56
G4-EN6	8, 9	Reduction of energy consumption	3.3 Energy management p. 56
G4-EN7	8, 9	Reductions in energy requirements of products and services	2.3 Product fuel efficiency p. 35
		WaterManagement approach	3.4 Water p. 60-61
G4-EN8	7, 8	Total water withdrawal by source	3.4 Water p. 61
G4-EN9	8	Water sources affected	3.4 Water p. 60
G4-EN10	8	Water recycled and reused	3.4 Water p. 60
		EmissionsManagement approach	3.3 Emissions p. 57-59
G4-EN15	7, 8	Direct greenhouse gas emissions Scope 1	3.3 Emissions p. 57
G4-EN16	7, 8 7, 8	Indirect greenhouse gas emissions Scope 2	3.3 Emissions p. 57
G4-EN17	8, 9 7, 8	Other indirect greenhouse gas emissions Scope 3	3.3 Emissions p. 59
G4-EN 19		Reduction of greenhouse gas emissions	3.3 Emissions p. 58
G4-EN21		Significant air emissions	3.3 Emissions p. 59
<p><i>Our assumptions for electricity are based on the following:</i></p> <p><i>Munich (headquarters): local emission factors (source: Munich municipal utility).</i></p> <p><i>Hannover/Ludwigsfelde (maintenance): national emission factors (source: German Federal Environmental Agency).</i></p> <p><i>Rzeszów (Aero Engines): national emission factors (Poland).</i></p> <p><i>Vancouver (maintenance): 100% hydroelectric power, therefore no emissions.</i></p> <p><i>For district heating, separate emissions factors must be determined for and applied to each facility; for Vancouver we estimate them. For the remaining energy sources (primarily natural gas and kerosene), we use the standard values issued by the German Environment Agency for all locations. Possible deviations due to the different composition of natural gas in Canada are very slight in relation to the overall emissions from this energy source (Canada <5 % of MTU Group total natural gas consumption).</i></p>			

Environment

GRI-Indicator	UNGC-Principle		Reference/Comments	
		Effluents and waste Management approach	3.4 Water	p. 60-61
			3.5 Material efficiency and waste	p. 63-65
G4-EN22	8	Total water discharge by quality and destination	3.4 Water	p. 61
G4-EN23	8	Total weight of waste by type and disposal method	3.5 Material efficiency and waste	p. 63-65
G4-EN24		Significant spills	3.1 Management approach: environmental protection	p. 54
			3.4 Water	p. 60
			3.5 Material efficiency and waste	p. 65
		Products and services Management approach	3.1 Management approach: environmental protection	p. 30
G4-EN27	7-9	Extent of impact mitigation of environmental impact of product and services	2.3 Climate strategy	p. 36-39
			3.4 Aircraft noise	p. 40-41
		Compliance Management approach	3.1 Management approach: environmental protection	p. 52-54
G4-EN29	8	Monetary value or non-monetary sanctions for non-compliance with environmental laws and regulations	3.1 Management approach: environmental protection	p. 54
		Transport Management approach	3.3 Emissions	p. 58
G4-EN30	8	Environmental impacts of transporting products and other goods and materials	3.3 Emissions	p. 58
			3.3 Emissions	
		Overall Management approach	3.1 Management approach: environmental protection	p. 52-54
G4-EN31	7-9	Total environmental protection expenditures and investments	3.1 Management approach: environmental protection	p. 52-53
		Supplier environmental assessment Management approach	2.7 Responsibility for the supply chain	p. 48-49
G4-EN33	8	Negative environmental impact in the supply chain	2.7 Responsibility for the supply chain	p. 48-49
		Environmental grievance mechanism Management approach	3.1 Management approach: environmental protection	p. 54
G4-EN34	8	Number of grievances about environmental impacts	3.1 Management approach: environmental protection	p. 54

GRI-Index – Specific Standard Disclosures

Labor practices and decent work

GRI-Indicator	UNGC-Principle		Reference/Comment
		Employment Management approach	4.1 Management approach: employment p. 68-71
G4-LA1	6	Staff turnover	4.1 Management approach: employment p. 71
G4-LA2		Benefits provided to full-time employees	4.3 Attractiveness as an employer <i>Our benefits apply to all employees. There is no distinction between full-time and part-time employees. For part-time employees, the principle of proportionate remuneration is applied.</i> p. 74-75
G4-LA3	6	Return to work after parental leave	4.3 Attractiveness as an employer
		Labor/Management relations Management approach	4.1 Management approach: employment p. 76
G4-LA4	3	Minimum notice periods	p. 68-71 <i>Agreements made between the employer and the works council that are governed by collective agreements can be terminated with three months' notice under Section 77 of the German Works Council Constitution Act (Betriebsverfassungsgesetz). This is generally also the case for the collective agreements. In cases in which the arbitration body's decision overrules an agreement between the works council and employer, the regulations regarding notice remain valid until replaced with others. Notice periods for the assertion of claims by employers or the employer are also firmly laid down in collective agreements. In accordance with Polish law, in Poland this period is two weeks for temporary contracts and one to three months for permanent contracts, dependent on the length of the term of employment. Canada: 60 days; U.S. according to WARN Act.</i>
		Occupational health and safety Management approach	4.2 Occupational health and safety p. 72-73
G4-LA5		Percentage of total workforce represented in formal joint management-worker health and safety committees	<i>The entire workforce of all our production sites is fully represented at the locally organized occupational safety committees, the composition of which reflects the legal requirements in the respective countries.</i>
G4-LA6		Injuries, occupational diseases, lost days and work-related fatalities	4.2 Occupational health and safety p. 72
		Training and education Management approach	4.3 Employee development p. 77-79
G4-LA9	6	Average hours of training per employee	4.3 Employee development p. 77
G4-LA10		Programs for lifelong learning	4.3 Employee development p. 77-79
G4-LA11	6	Percentage of employees receiving regular performance and career development reviews	4.3 Attractiveness as an employer p. 77
		Diversity and equal opportunity Management approach	4.5 Diversity & Equal opportunity p. 80-83
G4-LA12	6	Composition of governance bodies and employees	4.5 Diversity & Equal opportunity p. 80-83 Annual Report 2016 p. 34f.
		Equal remuneration for women and men Management approach	4.5 Diversity & Equal opportunity p. 82
G4-LA13		Ratio of basic salary and remuneration of women to men	4.5 Diversity & Equal opportunity p. 82
		Supplier assessment for labor practices Management approach	2.7 Responsibility for the supply chain p. 48-49
G4-LA15		Negative impacts for labor practices in the supply chain	2.7 Responsibility for the supply chain p. 48-49

Labor practices and decent work

GRI-Indicator	UNGC-Principle	Reference/Comment
	Labor practices grievance mechanism Management approach	4.1 Management approach: employment p. 70-71
G4-LA16	Number of grievances about labor practices	4.1 Management approach: employment p. 71

Human Rights

GRI-Indicator	UNGC-Principle	Reference/Comment
	Investment	2.7 Responsibility for the supply chain p. 46-49
G4-HR1	2	Significant investment agreements and contracts including human right clauses 2.7 Responsibility for the supply chain p. 48-49
	Non-discrimination Management approach	1.3 Compliance and human rights p. 23
		4.1 Management approach: employment, p. 70-71
		4.5 Diversity & equal opportunity p. 80-82
G4-HR3	6	Total number of incidents of discrimination 1.3 Compliance and human rights p. 23
		4.1 Management approach: employment p. 71
	Freedom of association and collective bargaining Management approach	1.3 Compliance and human rights p. 23
G4-HR4	3	Operations and suppliers identified in which the right to exercise freedom of association and collective bargaining may be violated 1.3 Compliance and human rights p. 23
		4.1 Management approach: employment p. 70-71
	Child labor Management approach	1.3 Compliance and human rights p. 23
G4-HR5	5	Operations and suppliers with significant risk for incidents of child labor 1.3 Compliance and human rights p. 23
		2.7 Responsibility for the supply chain p. 49
	Forced and compulsory labor Management approach	1.3 Compliance and human rights p. 23
G4-HR6	4	Operations and suppliers with significant risk for incidents of forced and compulsory labor 1.3 Compliance and human rights p. 23
		2.7 Responsibility for the supply chain p. 49
	Assessment Management approach	1.3 Compliance and human rights p. 23
G4-HR9	1	Operations that have been subject to human rights reviews 1.3 Compliance and human rights p. 23
	Supplier human rights assessment Management approach	2.7 Responsibility for the supply chain p. 48-49
G4-HR10	2	Percentage of new suppliers that were screened using human rights criteria 2.7 Responsibility for the supply chain p. 48-49
		<i>All new suppliers are contractually obligated to uphold MTU's Code of Conduct, which makes protection of human rights compulsory.</i>
	Human rights grievance mechanisms Management approach	1.3 Compliance and human rights p. 23
		4.1 Management approach: employment p. 70-71
G4-HR12	1	Number of grievance about human rights 1.3 Compliance and human rights p. 23
		4.1 Management approach: employment p. 70-71

GRI-Index – Specific Standard Disclosures

Society

GRI-Indicator	UNGC-Principle		Reference/Comment	
		Anti-corruption Management approach	1.3 Compliance and human rights	p. 20-23
G4-SO3	10	Operations assessed for risks related to corruption	1.3 Compliance and human rights	p. 21, 23
G4-SO4	10	Information and training on anti-corruption	1.3 Compliance and human rights	p. 21
G4-SO5	10	Confirmed incidents of corruption and corrective actions taken	1.3 Compliance and human rights	p. 23
		Public policy Management approach	1.1 Sustainability strategy and organization	p. 16
G4-SO6	10	Total value of political contribution	1.1 Sustainability strategy and organization	p. 16
		Anti-competitive behaviour Management approach	1.3 Compliance and human rights	p. 20-23
G4-SO7		Legal actions for anti-competitive behaviour and anti-trust and monopoly practices	1.3 Compliance and human rights	p. 23
		Compliance Management approach	1.3 Compliance and human rights	p. 20-23
G4-SO8		Monetary values of significant fines and non-monetary sanctions for non-compliance with laws	1.3 Compliance and human rights	p. 23
		Supplier assessment for impacts on society Management approach	2.7 Responsibility for the supply chain	p. 48-49
G4-SO9		Percentage of new suppliers that were screened using criteria for impacts on society	2.7 Responsibility for the supply chain <i>All new suppliers are contractually bound to comply with MTU's Code of Conduct, which is informed by the ten principles of the UN Global Compact.</i>	p. 48-49
G4-SO10		Negative impacts on society in the supply chain	2.7 Responsibility for the supply chain	p. 48-49
		Grievance mechanisms for impacts on society Management approach	1.3 Compliance and human rights 3.1 Management approach: environmental protection	p. 20-23 p. 54
G4-SO11		Number of grievances about impacts on society	3.1 Management approach: environmental protection	p. 54

Product Responsibility

GRI-Indicator	UNGC-Principle		Reference/Comment	
		Customer health and safety Management approach	2.6 Product quality and safety	p. 42-43
G4-PR1		Products and services for which health and safety impacts are assessed	2.6 Product quality and safety	p. 42-43
G4-PR2		Number of incidents of non-compliance with regulations concerning health and safety impacts	2.6 Product quality and safety	p. 42-43
		Products and service labeling Management approach	2.6 Product quality and safety	p. 42-45
G4-PR3		Product and service information procedures and percentage of product and services subject to such requirements	2.6 Product quality and safety	p. 43
G4-PR5		Results of surveys measuring customer satisfaction	2.6 Product quality and safety	p. 44-45
		Compliance Management approach	1.3 Compliance and human rights 2.6 Product quality and safety	p. 20-23 p. 42-43
G4-PR9		Monetary value of significant fines for non-compliance with laws concerning the use of products and services	2.6 Product quality and safety	p. 43

Materiality principle GRI G4-20-21

Material Topics	Relevance along the value chain		
	Upstream activities (e.g. supply chain)	Activities within the MTU Group	Downstream activities (e.g. flights operated by airlines)
Long-term value creation	significant	significant	significant
Compliance	significant	significant	significant
Stakeholder dialog		significant	significant
Product quality	significant	significant	significant
Product safety	significant	significant	significant
Product fuel efficiency		significant	significant
Product exhaust fumes*		significant	significant
Product noise emissions*		significant	significant
Innovation	significant	significant	significant
Responsible sourcing	significant	significant	significant
Environmental management/performance	significant	significant	significant
Human rights	significant	significant	significant
Attractiveness as an employer		significant	
Occupational safety	significant	significant	significant
Employee training and development		significant	significant
Health management		significant	significant
Diversity		significant	
Work-life balance		significant	
Demographic change		significant	
Corporate citizenship		significant	
Donations/sponsorship		significant	

*material topic for commercial aircraft engines due to inclusion in certification specifications



MTU Aero Engines AG
Dachauer Straße 665
80995 Munich • Germany
Tel. +49 89 1489-0
Fax +49 89 1489-5500
corporateresponsibility@mtu.de
www.mtu.de