MTU Aero Engines

22

Annual Report

MTU AERO ENGINES AG

FISCAL YEAR 2022

Key facts and figures with year-on-year comparison

[T1] Selected consolidated financial information and key figures at a glance

in € million (unless stated otherwise)	2022	2021	Change against previous year in %
Revenue and earnings			
Revenue	5,330	4,188	27.3
thereof: commercial engine business [1]	1,335	1,066	25.2
thereof: military engine business [1]	496	482	3.1
thereof: commercial maintenance business [1]	3,616	2,741	31.9
Gross profit	855	586	45.9
Earnings before interest and taxes (EBIT)	508	355	43.2
Net income	333	231	44.0
Adjusted earnings			
Adjusted earnings before interest and taxes (adjusted EBIT)	655	468	39.9
Adjusted EBIT margin (in %)	12.3	11.2	
Net income	476	342	39.2
Balance sheet			
Total assets	9,230	8,304	11.2
Equity	3,107	2,760	12.6
Equity ratio (in %)	33.7	33.2	
Net financial debt	753	673	11.8
Cash flow			
Cash flow from operating activities	728	567	28.3
Cash flow from investing activities	-400	-345	-15.9
Free cash flow	326	240	35.8
Cash flow from financing activities	-224	-276	19.0
Number of employees at year end			
Commercial and military engine business	6,973	6,497	7.3
Commercial maintenance business	4,300	4,011	7.2
Total number of employees	11,273	10,508	7.3
Share indicators			
Earnings per share in €			
Basic earnings per share	6.21	4.17	48.8
Diluted earnings per share	6.06	4.09	48.3

[1] Before consolidation

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To our shareholders

Letter to our shareholders

Dear shareholders,

As the new CEO, I am pleased to have the privilege to lead MTU Aero Engines AG into a successful future. I am confident that we can accomplish this if we continue to consistently align our actions

/ with our customers' satisfaction, by providing them with excellent products and custom services,
/ with our partners, who can rely on our quality and on-time delivery,
/ with our society, for whom we want to enable emission-free flying in the longer term,
/ and with you as our shareholders, because you expect to invest profitably.

From my perspective, five fields of focus can be derived from this approach. I would like to take this opportunity to tell you more about these.

Growth

MTU succeeded on its growth track in 2022. In 2023 as well, all business areas at MTU should post organic growth.

Revenue growth should be highest in the commercial series business. There is likely to be a strong rise in production of engines for the A320neo and regional and business aircraft. Engine production for long-haul aircraft is also likely to pick up steam again. The basis for this is the good order situation: In 2022, we received orders amounting to U.S.$600 million at the Farnborough International Airshow alone. This sum once again highlights the sustained recovery in our industry. There is strong demand among the commercial airlines for modern aircraft with fuel-efficient engines. Overall, the jet engine fleet with MTU participation should increase by 6.1 percent a year up to 2030. This opens up outstanding perspectives for us.

Growth in organic revenue in the spare parts business is also likely in 2023. This growth will be supported, in particular, by engines for regional aircraft as well as for short- and medium-haul aircraft, above all the V2500 for the traditional A320 family and the PW1100G-JM for the A320neo. The proportion of engines for long-haul aircraft should also increase. Engines for cargo aircraft continue to account for a high proportion of the aftermarket business.

In the commercial maintenance business, MTU expects to report organic revenue growth in 2023 as well. We see strong pent-up demand for MRO. In addition, demand is picking up as a result of the recovery in flight hours, particularly in the short- and medium-haul sectors and in the cargo sector.

MTU's military business should also post growth in 2023. The EJ200 engine for the Eurofighter will play a key role in this, including deliveries to export customers and a high volume of work in the aftermarket business to safeguard the availability of the fleet currently in use. MTU is also excellently prepared for the new generation of European fighter jets with the Next Generation Fighter Engine, which are beginning development. We will be using the attractive growth opportunities arising from this as well as the growth potential of the service and aftermarket business for established programs.

We intend to continue our growth track beyond the current year. Conditions are good for this: Aviation has a tailwind again, the market offers good perspectives in the medium and long term. We want to participate in this market growth, sustainably and at a higher than average rate.

It is certainly no easy goal, but we have good strategic options: In new business (OEM), we have set the target of increasing our share of work in engine programs. On the MRO side, we aim to exploit the growth potential provided by the new and existing engine types.

Profitability

At a revenue of €5.3 billion and adjusted earnings of €655 million, MTU generated an adjusted earnings margin of 12.3% in 2022. Adjusted net income came to €476 million, and the cash conversion rate was 69%. These results demonstrate that we have not only grown and operated profitably, we also exceeded our earnings forecast that we increased in late October upon review of the nine-month results. It goes without saying that we want to maintain our profitability even in the growth phase before us. With the clear goal of once again achieving the profitability of 2019. In other words: we want to be just as profitable as before the coronavirus crisis.

The keys to achieving this are production efficiency and our engine program profitability. On one hand, we are relying here on automation and digitalization to further optimize production operations and work flows. On the other hand, our best cost strategy also plays an essential role. In 2022, we opened MTU Maintenance Serbia, with a focus on repairing engine parts, near Belgrade as part of this strategy. This allows us to significantly expand our network for parts repair and offer competitive services on the market. At MTU Maintenance Zhuhai in China we began construction of a new training center, which will be completed soon. We will train up to 100 engine mechanics every year at that facility. Furthermore, we made considerable expansions at our Hanover location last year.

For you, our shareholders, MTU's profitability should pay off in the form of dividends. We are therefore proposing a dividend of €3.20 per share for 2022. We want to successively raise our dividend distribution ratio to around 40 percent of adjusted net income.

Portfolio

Profitable organic growth in all business areas requires that we continue to sustainably strengthen our core portfolio in both new business (OEM) as well as in commercial maintenance (MRO). We made good progress along these lines in 2022.

In the OEM business, our actions centered on modern, fuel-efficient engines. The improved version of the Geared Turbofan™, the GTF Advantage, is one example. Flight testing of the engine began in 2022. The engine generates further savings in terms of fuel consumption and emissions. Furthermore, it will be fully SAF compatible. In other words, the GTF Advantage can be operated completely using alternative, sustainably produced fuels, referred to as sustainable aviation fuels or SAFs. The new engines should be available beginning in 2024.

Achieving emission-free flying – commercial aviation's big goal and MTU's vision – requires us to continue investing in new, alternative engine technologies. Because our industry must undergo major changes – and it will.

With Claire, MTU's Clean Air Engine Technology Agenda, we are mapping out the specific path towards emission-free flying. Claire formulates solution options and potential for sustainable commercial engines. SAFs play a critical role here, too. MTU relies on evolutionary development of gas turbine technology based on the Geared Turbofan™ and revolutionary propulsion concepts like the water-enhanced turbofan and the flying fuel cell. The basis for the development of our future-proof portfolio is our clear commitment to the principles of the UN Global Compact.

MTU also sees technological opportunities arising in regard to military business, specifically the engines for the next generation of European fighter aircraft. Development work enables us to extend our technological expertise in the high-tech field, with possible scope for technology transfer to the commercial business.

In commercial maintenance, we expanded our range of services in 2022 while also reinforcing our flexibility and proximity to customers. By doing so, we have positioned ourselves optimally to exploit market opportunities.

We are now able to provide maintenance for the PW1100G-JM A320neo engine at three locations within the MTU network: In addition to MTU Maintenance Hannover and der EME Aero in Poland, MTU Maintenance Zhuhai has offered maintenance services for the PW1100G-JM since 2022. Even the Geared Turbofan™ engines for the Airbus A220 and the new generation of Embraer E-Jets, the PW1500G and the PW1900G, are now part of our maintenance portfolio. The work is carried out at EME Aero. Since 2022, MTU Maintenance Berlin-Brandenburg provides maintenance for complete PW800 engines that are used in various Gulfstream models and in Dassault's Falcon 6X. New additions to the MTU Maintenance Dallas portfolio include on-site services for Leap engines, which are used in the A320neo family and the Boeing 737 Max.

Since last year, MTU is the first MRO provider in the world to offer its customers trial runs with SAFs. By doing so, we are able to significantly reduce the CO2 emissions from acceptance tests. We are pleased to see our customers – like LAT AM, JetBlue and Aramco – making extensive use of this opportunity.

Operational excellence

In the years to come, demand from our customers will undoubtedly result in higher production rates and greater need for maintenance.

We are well prepared for this with our existing infrastructure, and we have shown in the past that we are capable of meeting the challenges. An example of this from 2022: in order to improve the readiness of the German air force, we prioritized maintenance of the Eurofighter engine EJ200 and the T64 for the Sikorsky CH-53G cargo helicopter in the short term and significantly shortened throughput in our military maintenance.

We can not allow ourselves to ease up at this point. In order to ensure smooth operation and successful ramp-up, we must maintain a clear focus on higher deliverability and a greater degree of stability in the supply chain.

In doing so, we keep an overview of the entire value chain. We secure the supply of raw materials through long-term contracts and have also introduced a sustainable circular economy. On the supplier side we focus on long-term relationships, close collaboration and the validation of several sources. We have increased the level of automation and digitalization in production and consistently implemented our best cost strategy. Our new matrix organization is highly scalable. Together with high transparency with regard to our customers and closely agreed lead times, it is the key to a successful ramp-up. Moreover, we are continually evaluating the necessity of investments.

Leadership

And last but not least, leadership and corporate culture are key components of my agenda. My predecessor, Reiner Winkler, modeled an excellent and integrative management style based on trust. I would like to continue in this style. Successfully leading a company is, after all, not up to an individual. Every CEO is only as strong as his team. MTU has an outstanding team of managers and employees. It is this group – with their abilities, their commitment and hard work – who makes it possible for the company to succeed in the first place. On behalf of the entire Executive Board, I would like to take this opportunity to extend my warm thanks to all of them.

And I am confident of this: If we continue to enhance our digital orientation and our agility, we can become even better. Because collaboration and transformation are drivers of an innovative, modern culture. With this and with interesting, future-proof jobs, we can gain ground in the labor market – even with new colleagues who we need for our growing business and the sustainability of MTU.

MTU's entire leadership team will align themselves with these five fields of focus. In doing so, we are working together to design a future of success for MTU.

Since February, the Executive Board term is once again complete with Dr. Silke Maurer in the role of Chief Operating Officer – and optimally situated for the challenges before us.

Through all of this, we have the constructive support of our Supervisory Board. We thank the members of the Supervisory Board for their long-term thoughts and actions in the interest of MTU.

We also thank our customers, partners and suppliers for the many years of cooperation based on trust and the receptiveness to taking this path with us.

Dear shareholders, I can assure you: The best is yet to come – in 2023 and beyond. I am gratified to have your continued support on this journey and thank you for your loyalty and your trust.

Sincerely yours
Lars Wagner

The Executive Board

Lars Wagner

Chief Executive Officer (CEO), *since January 1, 2023*
born in 1975
Degree in mechanical engineering and aeronautical engineering and an MBA
Appointed until December 31, 2025

Responsibilities:
Human resources, legal affairs, strategy, technology & engineering, corporate communications; Chief Sustainability Officer (CSO)

Peter Kameritsch

Chief Financial Officer (CFO)
and Chief Information Officer (CIO)
born in 1969
Degrees in physics and business administration
Appointed until December 31, 2025

Responsibilities:
Finance, IT

Dr. Silke Maurer
Chief Operating Officer (COO), *since February 1, 2023*
born in 1972
Degree in mechanical engineering
Appointed until January 31, 2026

Responsibilities:
Purchasing, Production, Assembly, Quality

Michael Schreyögg
Chief Program Officer
born in 1966
Degree in mechanical engineering
Appointed until June 30, 2026

Responsibilities:
Marketing & Sales and program management for MTU's commercial and defense programs, MTU maintenance locations

Reiner Winkler
Chief Executive Officer (CEO), *until December 31, 2022*
born in 1961
Degree in business administration
Resigned effective December 31, 2022

Responsibilities:
Human resources, legal affairs, strategy, corporate communications

Report of the Supervisory Board

Gordon Riske
Chairman of the Supervisory Board

MTU can look back over a successful year – despite the ongoing challenges caused by the coronavirus pandemic and the impact of the war in Ukraine on energy supply and supply chains. Thanks to its technological edge, balanced portfolio and broad customer base, MTU is well-positioned for continues growth in the future. The following sections contain the Supervisory Board's report on its activities in fiscal year 2022. The Supervisory Board will continue its close and trustful collaboration with all stakeholders in 2023.

Activities of the Supervisory Board

In this report, the Supervisory Board provides information in accordance with Section 171 (2) of the German Stock Corporation Act (AktG) on its activities in fiscal 2022 and the results of its review of the annual financial statements and consolidated financial statements. In 2022, the Supervisory Board carried out, fully and with due care, the duties of oversight and advice entrusted to it by law, the articles of association, and its own rules of procedure.

It regularly advised the Executive Board on the running of the company, continually supported and monitored the management of the business activities and assured itself that the Executive Board's dealings were proper and lawful. The Supervisory Board was informed and consulted in a direct and timely manner on all decisions of consequence for the company. The Executive Board provided the members of the Supervisory Board with regular, prompt and comprehensive information on the company's situation. The Supervisory Board received written monthly reports on the company's net assets, financial position and results of operations. At its meetings, the Supervisory Board also discussed the business performance of all of MTU's affiliated companies.

The Supervisory Board discussed the strategy and all important projects with the Executive Board. After examination and careful deliberation, the Supervisory Board endorsed the company's strategic orientation with its focus on sustainable and profitable organic and sustainable growth. The Supervisory Board passed resolutions on all transactions for which its approval was required in accordance with the law, the company's articles of association or the Executive Board's rules of procedure after reviewing and discussing them with the Executive Board. Preparatory meetings can also take place without the Executive Board as necessary. Moreover, the Supervisory Board regularly schedules meetings without the Executive Board.

In 2022, as in previous years, the Supervisory Board examined and oversaw the internal control mechanisms at MTU, especially the risk management system, internal auditing and legally compliant corporate governance. It examined these systems with the support of the Audit

Committee and in dialogue with the Executive Board and reached the conclusion that the company has implemented them effectively; in particular there is an effective internal control and risk management system for the accounting process. Furthermore, the Supervisory Board looked extensively at the company's compliance. In addition, the change of auditor for the annual financial statements and consolidated financial statements for fiscal 2023 was the subject of intensive deliberation.

In view of the legal requirements for stock corporations, which impose an obligation to obtain the consent of the Supervisory Board for certain related party transactions, the Supervisory Board adopted an internal procedure to comply with these requirements in 2020. In the reporting period, there were no transactions requiring consent or disclosure.

Meetings of the Supervisory Board

The Supervisory Board held five routine meetings and two extraordinary meetings in 2022. Two meetings were held in hybrid format: some members of the Supervisory Board attended in person while others participated by video conference. The members took part in all meetings, with the exception of one member, who was unable to participate in the two extraordinary meetings. Attendance was therefore 98.5%.

[T2] Supervisory Board members' attendance at meetings of the Supervisory Board and its committees

Supervisory Board members	No. of meetings attended (incl. committee meetings)	Meetings attended in %
Gordon Riske (Chairman), since May 5, 2022	7 / 7	100.0
Klaus Eberhardt (Chairman) until May 5, 2022	5 / 5	100.0
Josef Mailer (Deputy Chairman)	18 / 18	100.0
Roberto Armellini, until July 31, 2022	6 / 6	100.0
Dr. Christine Bortenlänger	14 / 14	100.0
Thomas Dautl	7 / 7	100.0
Daniele Frijia, since August 17, 2022	5 / 5	100.0
Dr.-Ing. Jürgen M. Geißinger	10 / 12	83.3
Anita Heimerl	7 / 7	100.0
Heike Madan	14 / 14	100.0
Dr. Rainer Martens	7 / 7	100.0
Dr. Joachim Rauhut	14 / 14	100.0
Univ. Prof. Dr. Marion A. Weissenberger-Eibl	7 / 7	100.0
Michael Winkelmann	7 / 7	100.0
Average attendance rate		**98.5**

At its meeting on March 8, 2022 the Supervisory Board discussed MTU's Annual Report. The Supervisory Board adopted the annual financial statements and the consolidated financial statements and approved the combined management report for the company and the Group for fiscal 2021. In addition, it looked in detail at the allocation of the net profit for 2021 available for distribution and approved the Executive Board's profit distribution proposal. A dividend payment of €2.10 per share eligible for the dividend was therefore proposed to the Annual General Meeting on May 5, 2022. The Supervisory Board approved the non-financial statement for the MTU Group and the company for fiscal 2021. Further, it discussed the appointment of the auditor and submitted a proposal to the Annual General Meeting that Ernst & Young GmbH Wirtschaftsprüfungsgesellschaft should be appointed to audit the annual financial statements and consolidated financial statements for fiscal 2022. Other issues examined by the Supervisory Board were the short-term incentive (STI) payable to the members of the Executive Board for 2021 and the definition of financial and non-financial targets for the award of STI payments to Executive Board members for 2022. Furthermore a resolution was adopted on amendment of the Supervisory Board's rules of procedure. The report of the Supervisory Board to the Annual General Meeting and the agenda for the meeting were also agreed on. Furthermore, the Supervisory Board approved the management compensation report and the corporate governance statement.

At its meeting on April 8, 2022, the Supervisory Board looked in detail at the company's situation and the impact of the war in Ukraine on MTU's business. The Executive Board also reported in detail to the Supervisory Board on the preliminary quarterly figures for the first quarter.

At the meeting on May 4, 2022, the Supervisory Board unanimously approved Reiner Winkler's request to rend his period of service as a member of the Executive Board and CEO as of the end of December 31, 2022. Moreover, it unanimously decided to appoint Lars Wagner as CEO of MTU effective January 1, 2023.

As part of its regular sustainability reporting, at the meeting on July 26, 2022, the Executive Board provided extensive information on MTU's progress towards emission-free flying. An important topic in this context was fuel cells in combination with sustainably produced hydrogen. Further, the Supervisory Board discussed in detail the strategic planning presented by the Executive Board. The focus was on key aspects of the planned participation in future engine programs, the plans for sustainable aviation and the proposed investments in MTU's network of companies. Digitalization was also discussed at length.

At an extraordinary meeting on September 28, 2022, the Supervisory Board appointed Dr. Silke Maurer to the Executive Board of MTU for a term of three years starting on February 1, 2023. As the Executive Board member responsible for OEM Operations, she is the company's Chief Operating Officer (COO). The Supervisory Board also resolved on the adjustment of the allocation of responsibilities among the Executive Board members effective February 1, 2023.

At its meeting on October 26, 2022, the Supervisory Board resolved that it would submit a proposal to the Annual General Meeting that KPMG be appointed as the new auditor for the annual financial statements and consolidated financial statements for fiscal 2023. This was preceded by a multi-step tender and selection process, which was performed by the Audit Committee and led to the recommendation on the appointment of KPMG as the auditor. In addition, the Executive Board provided information in a focus report on the strategy, status and outlook for the MRO business and the future development of MTU Maintenance Zhuhai. A summary of the results of the review of the efficiency of the Supervisory Board was presented and it was decided to hold a workshop for the Supervisory Board in February 2023 to work on them.

At the meeting held on December 13, 2022, the Supervisory Board undertook a detailed examination of the operational business plans and budget for 2023. The meeting also included a detailed review and confirmation of the management's compliance with the German Corporate Governance Code. Other topics discussed were MTU's sustainability strategy and the compensation of the Executive Board, especially the status of achievement of the ESG targets set for 2022. As recommended by the Nomination Committee, the Supervisory Board also resolved that at the Annual General Meeting it would put forward Ute Wolf, former Chief Financial Officer of Evonik Industries AG, as a candidate for the Supervisory Board. In addition, the Supervisory Board approved the Executive Board's decision to hold the Annual General Meeting 2023 as a virtual meeting.

At its meetings, the Supervisory Board also discussed the legal requirements and the recommendations of the German Corporate Governance Code regarding Executive Board compensation. The compensation system takes account of sustainability targets and provides for appropriate and motivating compensation.

Between official meetings, the Chairman of the Supervisory Board was regularly briefed on the company's current situation, significant business transactions and important pending decisions. This entailed regular meetings with the Executive Board, including consulting on strategy, the status of planning, the progress of business, the company's risk situation, the risk management system and compliance.

Corporate governance

The Supervisory Board is convinced that MTU's success is based, among other factors, on good corporate governance. For this reason, in 2022 the Supervisory Board once again looked in detail at the application and implementation of the German Corporate Governance Code, based on the current version of April 28, 2022. Furthermore, the Supervisory Board regularly discusses the composition of the Executive Board and Supervisory Board with a view to diversity and the appropriate inclusion of women.

The Supervisory Board's rules of procedure contain binding provisions for dealing with conflicts of interest. Such conflicts must be disclosed and, where appropriate, may result in termination of the member's term of office. This also applies for proposals for election submitted to the Annual General Meeting. There were no conflicts of interest in the reporting period. With the exception of a consulting agreement between a Supervisory Board member and one of the company's suppliers, there were no consulting agreements, contracts for services or similar contractual agreements between members of the Supervisory Board and MTU Aero Engines AG or any of its subsidiaries, or with customers, suppliers, lenders or other third parties in 2022. If there are any discussions or resolutions affecting this supplier in future, the Supervisory Board member concerned will not take part in them. There were no such discussions or resolutions in the reporting period.

The Supervisory Board also undertook a detailed examination of the recommendations of the GCGC on the independence of the members representing the shareholders. The Supervisory Board deems all of its members to be independent. This expressly applies to the employee representatives and to Dr. Rainer Martens, who ceased to be a member of MTU's Executive Board at the end of 2017. Moreover, it applies to Dr. Jürgen M. Geißinger and Dr. Joachim Rauhut, who have been members of the Supervisory Board for more than 12 years. Consequently, all Supervisory Board committees consist exclusively of independent members. The Supervisory Board has set four terms of office as the maximum for membership of the Supervisory Board and considers this to be appropriate for MTU. Members of the Supervisory Board undertake training on their own responsibility, with support from MTU where necessary. MTU may also defray the costs of training. In fiscal 2022, MTU provided support by arranging presentations on Germany's Second Act on Equal Participation of Men and Women in Management Positions (FüPoG II), the German Act on Strengthening Financial Market Integrity (FISG) and on developments in the fields of cybersecurity and artificial intelligence.

In consultation with the Executive Board, the Supervisory Board ensures long-term succession planning for appointments to the Executive Board. To this end, the Supervisory Board regularly reviews the present term of all Executive Board contracts, taking into account, in all cases, the age of each member and the competency profile of potential candidates.

There is an onboarding process for new members of the Supervisory Board. This gives them a thorough insight into MTU's product portfolio, strategy, corporate governance and how the Supervisory Board works.

The Supervisory Board regularly assesses how effectively the Supervisory Board as a whole and its committees perform their tasks. In 2022, the Supervisory Board conducted a self-assessment of the work in plenary session, with the aid of an external consultant. This took the form of a questionnaire and individual interviews with each Supervisory Board member and the Executive Board. The topics covered included, in particular, strategy, structures and processes, culture, composition, leadership and ESG. Benchmarking against a selected peer group of companies was also used. The results were discussed with the Supervisory Board at a separate workshop. They form the basis for the ongoing development of the work of the Supervisory Board and its profile of skills and expertise as well as for the final assessment by the Supervisory Board, that its work was, and still is, performed efficiently.

In 2022, the Audit Committee also performed another self-assessment. This comprised a questionnaire developed by an external firm of lawyers. The focal areas of this self-assessment were the qualifications and organization of the committee and oversight of financial reporting and auditing, and the internal auditing and risk management system. The Audit Committee also assessed its efficiency as good in 2022.

Cooperation between the Supervisory Board and the Executive Board, and among the members of the Supervisory Board, in the past fiscal year was judged to be very good. No conflicts of interest arose between MTU and any member of its Executive Board or Supervisory Board.

In a joint declaration with the Executive Board dated December 13, 2022, in accordance with the requirements of Section 161 of the German Stock Corporation Act (AktG), the Supervisory Board states that MTU Aero Engines AG complies with all the recommendations of the German Corporate Governance Code (GCGC) in the version dated April 28, 2022. This declaration of conformity is reproduced in this Annual Report in the *section of the management report headed "Corporate governance statement,"* together with a more detailed description of the company's corporate governance system. The declaration has also been posted on the *MTU website.* In addition, the company observes all suggestions made in the German Corporate Governance Code.

Committee meetings

By convention, the Supervisory Board has three committees with equal numbers of employee and shareholder representatives: an Audit Committee, a Personnel Committee and – in compliance with Section 27 (3) of the German Codetermination Act (MitbestG) – a Mediation Committee. Each of these committees presents regular reports on its activities at the plenary meetings of the Supervisory Board.

A Nomination Committee, which meets on an ad hoc basis, has been set up in accordance with the recommendations of the German Corporate Governance Code. The task of the Nomination Committee is to find suitable candidates for election to the Supervisory Board. Its members are Gordon Riske (Chairman, since May 5, 2022) / Klaus Eberhardt (until May 4, 2022) and Dr. Jürgen M. Geißinger. In 2022, the Nomination Committee held one meeting in the form of a video conference.

The Personnel Committee comprises Gordon Riske (Chairman, since May 5, 2022) / Klaus Eberhardt (until May 4, 2022), Dr. Jürgen M. Geißinger and two employee representatives, Josef Mailer and Roberto Armellini (until July 31, 2022) / Danielle Frijia (since August 17, 2022). Among other things, it deals with the employment contracts of Executive Board members, including their compensation and the recommendation of candidates. The Personnel Committee convened four times in 2022, with one meeting held in hybrid format (with some members attending in person while others took part by video link; the total attendance rate at meetings of the committee was 93.8% as one member was unable to attend an extraordinary meeting). Issues examined included the short-term incentive (STI) payable to the members of the Executive Board for 2021, the definition of targets for the award of STI payments to Executive Board members for 2022, including the targets and bandwidths for the ESG criteria, and the recommendation to the Supervisory Board for the appointment and compensation of members of the Executive Board.

The Mediation Committee, whose members are identical with those of the Personnel Committee, did not have to convene in 2022.

The members of the Audit Committee are Dr. Joachim Rauhut (Chairman), Dr. Christine Bortenlänger, Heike Madan and Josef Mailer. It held six routine meetings and one extraordinary meeting in the year under review. Two of the meetings were video conferences and one was held in hybrid format (some members attended in person, others took part via video link). Attendance was 100%.

The Audit Committee focused on reviewing the annual financial statements, the consolidated financial statements and the combined management report, including the non-financial statement of the MTU Group and MTU Aero Engines AG as well as the company's net assets, financial position and results of operations, and the annual and half-year reports and quarterly statements. In addition, it prepared the Supervisory Board's proposal to the Annual General Meeting on the appointment of the auditor. Further, it was responsible for engaging the auditor, the agreement with the auditor on the audit fees, and for specifying the key areas of focus for the audit of the annual financial statements and consolidated financial statements for 2022.

The Audit Committee oversaw the quality of the audit and the independence of the auditor. To this end, it obtained the auditor's statement of independence in accordance with Section 107 (3) sentence 2 of the German Stock Corporation Act (AktG).

Furthermore, the Audit Committee discussed the additional services provided by the auditor. The procedure for procuring the non-audit services provided by the auditors was reviewed and affirmed and the content and fees for such services in the reporting period were approved on a case-by-case basis.

At four of its seven meetings and through additional direct discussions between the Chairman of the Audit Committee and the auditor, the Audit Committee obtained reports from the auditor on its audit strategy and approach, the audit process, especially its effectiveness and progress, and the results of the audit, and asked critical questions. Moreover, it examined the qualification of the persons engaged to conduct the audit and the auditor's general quality assurance concept and its practical application. During the reporting period, the committee supplemented this with publicly available information on the quality controls performed by the auditor and its competitors.

The committee and other members of the Supervisory Board received the audit reports from Ernst & Young for their deliberations. These documents were reviewed in detail in the presence of the auditor. On this basis, the committee recommended that the Supervisory Board should adopt the financial statements and consolidated financial statements for the fiscal year 2022, and approve the combined management report and the Executive Board's profit distribution proposal.

In accordance with statutory requirements, the Audit Committee monitored the accounting process, the accounting-related internal control and risk management system and the internal auditing system, which it judged to be effective. It oversaw the company's compliance activities and received reports from the internal auditors. The Audit Committee received reports from the heads of the Corporate Audit and Compliance unit and on related party transactions. No material weaknesses were established in the internal control system for the accounting process or system for early identification of risks.

Other items examined by the Audit Committee were the tender for the audit engagement, including recommending a candidate to the Supervisory Board, the EMIR audit for fiscal 2021, MTU's currency hedging model, aircraft financing and the current status of ongoing campaigns. In addition, the committee obtained an update on the status of non-financial reporting and the organization of accounting and on the ongoing development of the risk management system and the internal control system.

Adoption of the annual financial statements, the approved consolidated financial statements and the management report

The annual financial statements, consolidated financial statements and combined management report of the MTU Group and MTU Aero Engines AG for 2022 were audited by Ernst & Young, Munich, whose appointment was approved by the Annual General Meeting. Ernst & Young issued an unqualified audit opinion. This was signed by Christian Baur and Gerhard Stummer, who have audited MTU since 2021 and 2020, respectively. The audit reports and documents to be reviewed were submitted in good time to all members of the Supervisory Board. The Chairman of the Audit Committee reported to the Supervisory Board on the audit performed by Ernst & Young. On this basis, the Supervisory Board conducted a thorough review of the annual financial statements, consolidated financial statements and the combined management report, including the non-financial statement of the MTU Group and MTU Aero Engines AG for 2022 and the Executive Board's proposal for the distribution of the net profit. The auditor attended the meeting of the Audit Committee of MTU Aero Engines AG on March 14, 2023, and the meeting held by the Supervisory Board on March 21, 2023 to discuss the financial statements, and presented the main findings of the audit. The Supervisory Board reviewed the annual financial statements, consolidated financial statements, combined management report including the non-financial statement, and the profit distribution proposal, and raised no objections. The company's annual financial statements and consolidated financial statements for 2022, as submitted by the Executive Board, were approved at the Supervisory Board's meeting on March 21, 2023. The annual financial statements are therefore adopted. The Supervisory Board agreed to the Executive Board's proposal for the distribution of the net profit after giving due consideration to the interests of the company and its shareholders. A dividend payment of €3.20 per share eligible for the dividend will therefore be proposed to the Annual General Meeting.

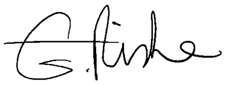
Changes in the governing bodies

With the agreement of the Supervisory Board, the company's CEO, Reiner Winkler, terminated his contract at year-end 2022 for personal reasons. The Supervisory Board thanks Reiner Winkler, who played a key role during more than two decades and has ensured that MTU is now an extremely well-positioned company with excellent future prospects. Lars Winkler, Chief Operating Officer, was appointed unanimously as new CEO effective January 1, 2023. Dr. Silke Maurer became the new Chief Operating Officer (COO) on February 1, 2023.

There were two changes on the Supervisory Board in 2022. On the employees' side there was one change: Roberto Armellini was a member of the Supervisory Board until July 31, 2022; Daniele Frijia has been a member since August 17, 2022. The Supervisory Board thanks Roberto Armellini for his work. On the shareholders' side, as announced in 2020, Klaus Eberhardt stepped down from the Supervisory Board at the end of the company's Annual General Meeting on May 5, 2022. The Supervisory Board thanks Klaus Eberhardt for his many years of service and his enormous commitment. Gordon Riske, former CEO of KION GROUP AG is the new Chairman of the Supervisory Board of MTU Aero Engines AG. He was elected to the Supervisory Board at the company's Annual General Meeting on May 5, 2022 with 97.46% of the votes. The Supervisory Board then elected him as Chairman of the Supervisory Board.

The Supervisory Board would like to thank the Executive Board for its close and constructive collaboration. It would also like to thank all employees and the Works Council for their successful work and enormous commitment in 2022. Moreover, the Supervisory Board is grateful to all MTU's shareholders for the trust they place in the company.

Munich, March 21, 2023



Gordon Riske
Chairman of the Supervisory Board

The Supervisory Board

Members of the Supervisory Board and the additional mandates they hold on supervisory boards or comparable oversight bodies of other business enterprises in Germany or abroad

Gordon Riske, since May 5, 2022

Chairman of the Supervisory Board

Independent management consultant

Former CEO of KION Group AG, Frankfurt am Main

Atlas CopCo AB
Sunlight Group Energy Storage Systems S.A.
Weichai Power Co., Ltd.

Klaus Eberhardt, until May 5, 2022

Chairman of the Supervisory Board

Independent consultant

Former CEO of Rheinmetall AG, Düsseldorf

ElringKlinger AG

Josef Mailer

Deputy Chairman of the Supervisory Board

Chairman of the Group Works Council of MTU Aero Engines AG, Munich

Chairman of the Works Council of MTU Aero Engines AG, Munich

Roberto Armellini, until July 31, 2022

First authorized representative and director of IG Metall, Augsburg

Dr. Christine Bortenlänger

Chief Executive of Deutsches Aktieninstitut e.V., Frankfurt am Main

Covestro AG
Covestro Deutschland AG (Covestro Group)
Siemens Energy AG
Siemens Energy Management GmbH
(Siemens Energy Group)
TÜV Süd AG

Thomas Dautl

Director Technical Supplier Management and Development, MTU Aero Engines AG, Munich

Daniele Frijia, since August 17, 2022

Managing director and cashier of IG Metall Munich

Linde GmbH
Linde Holding GmbH
Nokia Solutions and Networks GmbH

Dr.-Ing. Jürgen M. Geißinger

Independent entrepreneur

Former CEO of Schaeffler AG, Herzogenaurach

Bizerba Management SE
Bizerba SE & Co. KG (Bizerba Group)
clean-tek Holding AG, Switzerland,
since November 1, 2022
Marquardt Management SE
J. & J. Marquardt KG (Marquardt Group)

Anita Heimerl

Member of the Group Works Council of MTU Aero Engines AG, Munich

Full-time member of the Works Council of MTU Aero Engines AG, Munich

Heike Madan

Managing director and second authorized representative of IG Metall Aalen & Schwäbisch Gmünd | Ostalb

KONE GmbH
ZF Automotive Germany GmbH,
since November 21, 2022

Dr. Rainer Martens

Independent consultant

Formerly Chief Operating Officer of MTU Aero Engines AG, Munich

Dr. Joachim Rauhut

Independent consultant

Former member of the Executive Board of Wacker Chemie AG, Munich

creditshelf AG
J. Heinrich Kramer Holding GmbH, until March 30, 2022
Stabilus S.A.

Univ. Prof. Dr. Marion A. Weissenberger-Eibl

Director of the Fraunhofer Institute for Systems and Innovation Research ISI in Karlsruhe and holder of the Chair of Innovation and Technology Management at the Karlsruhe Institute of Technology

HeidelbergCement AG

Michael Winkelmann

Employee at MTU Maintenance Berlin-Brandenburg GmbH, Ludwigsfelde

Corporate health management

MTU Maintenance Berlin-Brandenburg GmbH

Supervisory Board committees

Personnel Committee

Gordon Riske, Chairman, since May 5, 2022
Klaus Eberhardt, Chairman, until May 5, 2022
Daniele Frijia, since August 17, 2022
Roberto Armellini, until July 31, 2022
Dr.-Ing. Jürgen M. Geißinger
Josef Mailer

Audit Committee

Dr. Joachim Rauhut, Chairman
Dr. Christine Bortenlänger
Heike Madan
Josef Mailer

Mediation Committee

Gordon Riske, Chairman, since May 5, 2022
Klaus Eberhardt, Chairman, until May 5, 2022
Daniele Frijia, since August 17, 2022
Roberto Armellini, until July 31, 2022
Dr.-Ing. Jürgen M. Geißinger
Josef Mailer

Nomination Committee

Gordon Riske, Chairman, since May 5, 2022
Klaus Eberhardt, Chairman, until May 5, 2022
Dr.-Ing. Jürgen M. Geißinger

The MTU share

Difficult conditions for the equity markets

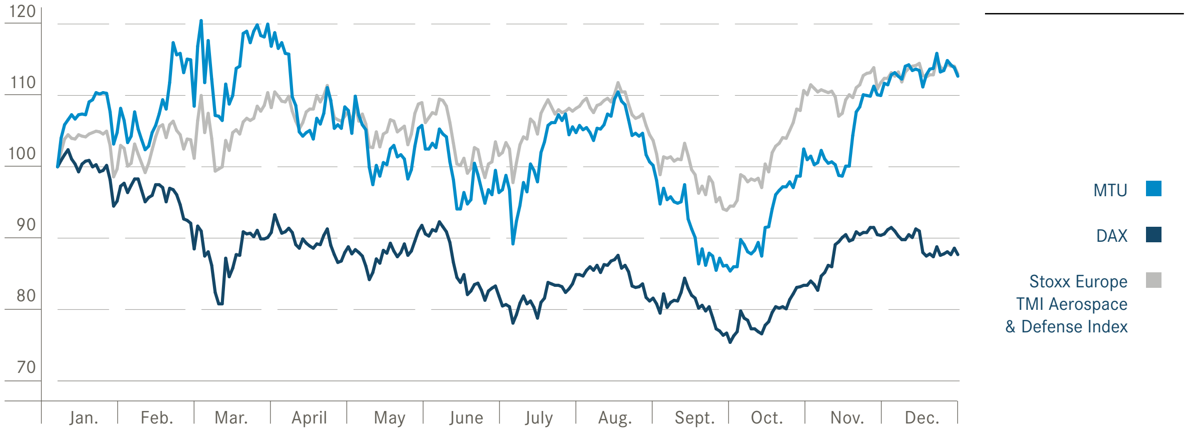
2022 was a difficult year for the global equity markets. The German blue-chip index, DAX, reached its highest level for the year at around 16,272 points in early January. The first quarter brought a substantial correction. Following the outbreak of war in Ukraine at the end of February, the downward price trend gathered pace, with the index dropping below 13,000 points at times. A highly volatile sideways trend followed, with repeated massive price downturns. Recessionary trends, rising gas, oil and electricity prices, the generally high level of inflation and the increase in key interest rates unsettled the equity market. The DAX dropped to a low for the year of 11,976 points at the end of the September but rallied in the fourth quarter, with the recovery driven by robust corporate figures, declining gas prices and hopes of a less restrictive monetary policy. The DAX closed the year at 13,924 points at the end of December 2022; nevertheless that was a drop of 12.3% over the year.

The price performance of many shares was once again highly sector-dependent in 2022. Following the recovery of many aviation stocks in 2021, the sector performance on the equity markets was again very robust in 2022. IATA predicted a faster recovery in air traffic. Passenger traffic increased considerably in 2022 and could be back at the pre-crisis level in 2023 – a year earlier than anticipated. Helped by such news, shares in the aviation sector significantly outperformed the market as a whole. The Stoxx Europe TMI Aerospace & Defense Index, which includes shares of MTU as well as the Airbus Group, Safran, and Rolls-Royce, posted a positive trend in 2022: over the year it rose 13.0%, driven principally by companies in the defense sector.

MTU shares: a slight price increase over the year

Following a challenging year in 2021, MTU's share price was €186.60 at the beginning of 2022. Despite the difficult conditions for equities due to the war in Ukraine, high inflation and the energy crisis, MTU's share price rose significantly in the first quarter, reaching a high for the year of €216.20 on February 28, 2022. After that the share price was volatile as it was unable to shake off the weak market sentiment. On September 29, 2022, the share price dropped to €153.20, its lowest level in the year. In October, the company reported a positive business performance in the first nine months and raised its guidance for the full year. At the Investor & Analyst Day on November 17, 2022, MTU presented convincing growth prospects for the period 2023 through 2025. The pleasing figures and general improvement in capital market conditions led to a significant increase in MTU's share price in the fourth quarter. The closing price at year-end was €202.20, a gain of 12.7% over the year. Consequently, the share outperformed the DAX index. MTU's market capitalization was around €11 billion at year-end 2022.

[T3] MTU share performance in 2022 compared with stock market indices (indexed; Dec. 31, 2021 = 100)



[T4] Year-on-year indicators for shares in MTU

		2022	2021
Highest price for the year[1]	€	216.20	223.00
Lowest price for the year[1]	€	153.20	162.65
Price at start of year[1]	€	186.60	211.50
Year-end price 1)	€	202.20	179.40
Performance over the year[2]	%	+ 13	– 16
Market capitalization at year end	€ million	10,808	9,586
Average daily trading volume	€ million thousand shares	35 186	40 203
Earnings per share	**€**	**6.21**	**4.17**
Dividend per share	**€**	**3.20[3]**	**2.10**

[1] Xetra closing price.
[2] Based on Xetra year-end share price (Dec. 31).
[3] Proposal to the Annual General Meeting.

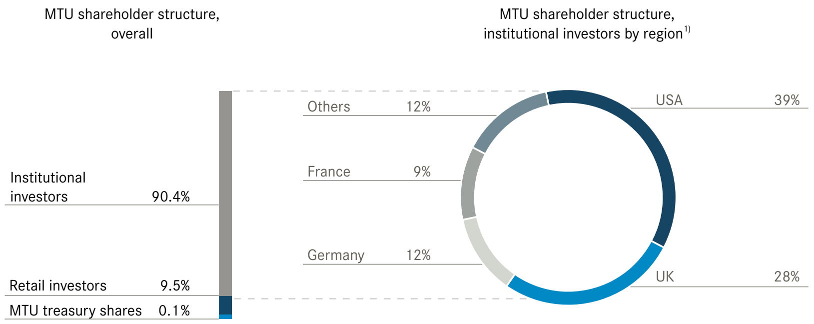
Dividend

Shareholders participate in MTU's success through a dividend. The Executive Board and Supervisory Board have decided to pay a dividend for 2022. At the Annual General Meeting on May 11, 2023, they will propose payment of a dividend of €3.20 per share for the fiscal year 2022. The dividend would be paid on May 16, 2023. The payment ratio would be 36% of MTU's adjusted net income.

Trading volume

In 2022, the average number of MTU shares traded via Xetra trading was 186,000 shares per day, compared with 203,000 per day in 2021. The highest number of shares traded was 631,723 on February 28, 2022. The average daily trading volume was around €35 million (previous year: €40 million). At the end of 2022 MTU ranked 28th in the DAX 40 index in terms of market capitalization (previous year: 39th).

[T5] Shareholder structure



[1] Approximation based on top 100 shareholders.
Source: Shareholder analysis, as of Q4 2022.

High proportion of institutional shareholders

Voting rights totaled 53,453,112 in 2022. The free float was 100% on December 31, 2022. 0.12% of the shares were held by the company.

Around 90.4% of the free float was held by institutional investors and 9.5% by retail investors. The majority of institutional investors are based in the USA, the UK or Germany. At the end of 2022, notifications under Section 21 (1) of the German Securities Trading Act (WpHG) had been received from the following institutional shareholders:

[T6] Institutional investors with voting rights > 3%

DGAP	Investor	Voting rights in %[1]	No. of MTU shares
Dec. 21, 2022	BlackRock, Inc., USA	9.02%	4,820,528
Apr. 4, 2022	Union Investment Privatfonds GmbH, Germany	3.01%	1,610,467
Dec. 1, 2021	Kenneth C. Griffin, Ireland	3.05%	1,630,560
Feb. 18, 2021	The Capital Group Companies, USA	9.94%	5,313,778
Apr. 23, 2020	Euro Pacific Growth Fund, USA	4.83%	2,583,956
Sept. 26, 2018	Massachusetts Financial Services Company, USA	4.79%	2,561,829

[1] Investor share in % translated on the basis of the current voting rights of 53,453,112.

Broad coverage by analysts

As of December 31, 2022, 24 analysts were reporting regularly on MTU. At the end of December, 15 financial institutions rated the stock as a buy, 8 had it on hold and one had a sell recommendation (2021: 14 “buy,” 8 “hold,” 3 “sell”). The average price target was €225.

[T7] The following financial institutions report regularly on MTU:

Agency Partners	DZ Bank	Landesbank Baden-Württemberg
Alpha Value Research	Exane BNP Paribas	Metzler
Barclays	Goldman Sachs	ODDO Securities Research
Berenberg	Hauck & Aufhäuser	Société Générale
BernsteinResearch	HSBC	Stifel
BoA Merrill Lynch	Jefferies	UBS
Citi Global Markets Research	JPMorgan Cazenove	Vertical Research
Deutsche Bank	Kepler Cheuvreux	Warburg Research

Intensive investor relations work

In 2022, MTU once again organized many IR events. Due to the coronavirus situation, most one-on-one meetings with investors and investors’ conferences were held remotely. In all, MTU took part in 15 international investors’ conferences, including Commerzbank’s German Investment Seminar in New York, the 11th German Corporate Conference in Munich organized by Berenberg and Goldman Sachs, the Goldman Sachs Industrials Conference in London, and the Berenberg European Corporate Conference in Pennyhill.

A key platform for dialogue with shareholders was the MTU Annual General Meeting, which was held digitally on May 5, 2022, as a video webcast. Around 74% of the share capital with voting rights was represented (prior year: around 72%).

Many discussions with investors also took place remotely in 2022. In all, MTU had around 1,000 contacts with investors. The annual Investor and Analyst Day took place in London on November 17, 2022. This brought together the MTU Executive Board and around 150 analysts and investors both virtually and in person. At this event, MTU published its forecast for the 2023 fiscal year and confirmed its growth prospects for 2024 and 2025.

In the reporting period, the IR team received awards for its work. In the “Institutional Investor Survey 2022 All Europe Executive Team”, MTU was ranked second overall in the Aerospace & Defense sector.

Information on IR topics can be found in the Investor Relations section of the MTU website (www.mtu.de). You are also welcome to contact the IR team by calling +49 (0)89 1489-4787.

Management compensation report

The compensation report describes the principles applied in determining the compensation for the Executive Board and Supervisory Board of MTU Aero Engines AG, and states the amount and composition of that compensation. The compensation report complies with the provisions of Section 162 of the German Stock Corporation Act (AktG).

Principles of the compensation system for members of the Executive Board

At the proposal of the Personnel Committee of MTU Aero Engines AG, the Supervisory Board decides on a system of compensation for the members of the Executive Board, including the material contractual elements such as such as the total amount of the compensation and its breakdown into non-performance-related and performance-related components. The Personnel Committee regularly reviews the appropriateness and alignment with the market of the Executive Board compensation. For this, it uses the expertise of independent external compensation experts with regard to both the compensation system and the structure of the target direct compensation compared with relevant stock market segments.

The management compensation system, which was modified in 2021 to take account of the second Shareholder Rights' Directive (ARUG II) and the German Corporate Governance Code (GCGC) and approved by the Annual General Meeting on April 21, 2021 (agenda item 7) has been applied unchanged since 2021. The continuation of the previously mentioned compensation system takes account of the resolution passed at the Annual General Meeting in 2022 on the approval of the compensation report with an approval rate of 76.9%.

In addition to taking into account the achievement of the financial performance targets (adjusted EBIT and free cash flow), payment of the short-term incentive (STI) includes the achievement of non-financial performance targets, i.e., environmental, social and governance (ESG) targets. Disbursement of the long-term performance-related component, the Restricted Stock Plan (RSP or LTI – Long-Term Incentive), is based on the multi-year achievement of the performance targets adjusted EBIT and relative total shareholder return (TSR), which are both given equal weighting.

This is designed to focus the management on the sustainable success of the company, its investors and society.

Principles of total compensation

[T8] Structure of the compensation system (total target direct compensation)

Non-performance-related components	~ 39%	Fixed compensation	Contractually agreed fixed compensation, paid in 12 equal installments
	~ 1%	Fringe benefits	- Taxable reimbursements of expenses - Cash equivalent of payments in kind - Insurance premiums
Performance-related components	~ 60%	Short-term incentive (STI) (performance-related component excluding long-term incentive)	~ 40% of variable compensation Financial performance criteria: Adjusted EBIT and free cash flow Cap 0–200% Non-financial ESG targets are taken into account via a multiplier (0.8-1.2).
		Restricted Stock Plan (RSP) (performance-related component as long-term incentive)	~ 60% of variable compensation Financial performance criteria: Adjusted EBIT and relative Total Shareholder Return Cap 0–200 % Effectively granted as MTU shares (4-year holding period)

Non-performance-related components

Non-performance-related compensation, which normally makes up around 40% of the target direct compensation, is paid on a monthly basis and consists of fixed compensation and fringe benefits. The fringe benefits comprises taxable reimbursements of expenses such as insurance premiums, including any taxes thereon, and the cash equivalent of payments in kind such as the provision of company of company cars for business and private purposes.

Performance-related components

Performance-related compensation makes up around 60% of the target direct compensation; it consists of a short-term incentive (STI) and the Restricted Stock Plan (RSP / LTI).

Short-term incentive (STI)

Performance-related compensation is paid in the form of a short-term incentive (STI). It normally comprises approximately 40% of the performance-related components. Its effective calculation depends on the degree of target achievement for two equally weighted key performance indicators at Group level – adjusted EBIT and free cash flow.

Adjusted EBIT is calculated by adjusting the operating earnings indicator EBIT for the following special items:

In connection with the acquisition of 100% of the shares in MTU by Kohlberg Kravis Roberts & Co. Ltd. (KKR) in 2004 from what was then DaimlerChrysler AG, assets, liabilities and contingent liabilities were identified pursuant to IFRS 3 and initially measured at fair value. When calculating adjusted EBIT, an adjustment is made for the special items relating to subsequent measurement of these balance sheet items as "effects from purchase price allocation."

In connection with the increase in the stake in the V2500 program in 2012, a program asset (other assets) was acquired. When calculating the adjusted EBIT, an adjustment is made for the special items resulting from this program asset, which is accounted for as successive reduction revenue over its estimated economic life as "effects from an increase in the IAE-V2500 stake."

In addition, an adjustment is made for material special items resulting from extraordinary effects such as impairment losses, also especially in the reporting period in connection with Russia's war of aggression in Ukraine, as well as accrued restructuring expenses and material changes in the consolidated group.

MTU determines its free cash flow by combining its cash flow from operating activities with its cash flow from investing activities and eliminating components of the latter (non-recurring cash flows) that lie outside the operational management of the core business. MTU identifies the following as non-recurring items to be adjusted: payments for the acquisition of shares in engine programs, payments in connection with interest-bearing loans and financial assets held the purposes of liquidity management, and net cash inflows in connection with the acquisition and divestment of material Group companies.

The performance targets adjusted EBIT and free cash flow to be achieved in the respective fiscal year to ensure full payment of the STI component of the target direct compensation are set annually in advance by the Supervisory Board, taking the operational business plan into account. The target achievement levels for both performance targets are calculated on this basis, the arithmetic mean of which corresponds to the STI target achievement level. The entry threshold for the STI target achievement level was set at 80%, which, if achieved, corresponds to payment of 50% of the STI component. There is no STI entitlement below this entry threshold. Similarly, the maximum payment is capped at 200%, which is payable if the maximum STI target achievement of 120% is reached. Between the entry threshold, the 100% level and maximum STI target achievement, the payment percentage is interpolated on a straight line in each case.

The non-financial performance targets of relevance for the STI comprise ESG targets from the areas of environmental management, compliance, social commitment, growth & resilience, product stewardship & quality, innovation, attractiveness as an employer, employees & diversity as well as responsible procurement and digital issues. The ESG targets, their level and the target achievement ranges are also set annually by the Supervisory Board, taking corporate planning into account. The corresponding ESG multiplier is derived from the achievement of the ESG targets and takes the form of a scaled increase or reduction in the STI payment of up to 20% - ESG multiplier between 0.800 and 1.200.

If the term of office of a new Executive Board member starts during a fiscal year, the entitlement to the STI is granted on a pro rata temporis basis.

Restricted Stock Plan (RSP)/Long-term incentive (LTI)

For the long-term performance-related compensation component Restricted Stock Plan (RSP or LTI - long-term incentive), payment is calculated from target achievement over a three-year performance period, comprising the fiscal year in which the payment is granted and the two preceding years. The arithmetic mean of the achievement of the average adjusted EBIT target and the average relative total shareholder return (TSR) of MTU shares relative to the STOXX Europe Total Market Aerospace & Defense index (reference index) – TSR target achievement – is calculated for the performance period (performance criteria).

Achievement of the adjusted EBIT target is calculated for each year in the performance period using the same method as is used to determine the STI payment percentage.

Achievement of the TSR target for each year in the performance period is derived by comparing the average performance of shares in MTU and the reference index in the 30 trading days immediately prior to the end of the fiscal year or the end of the preceding fiscal years. The entry threshold for the TSR target component has been set at a relative performance versus the reference index of −10 percentage points. This corresponds to a payment of 50%. The maximum TSR target achievement is outperformance of the index by +10 percentage points, corresponding to an LTI payment level of 200%. Analogously to the STI, the TSR target achievement level is interpolated on a straight line between the entry threshold, and a relative performance of zero and maximum target achievement.

The RSP / LTI payment percentage for the three-year performance period is calculated as the arithmetic mean of the multi-year achievement of the adjusted EBIT target or the related adjusted EBIT payment percentage and the TSR target achievement or the associated TSR payment percentage. The RSP / LTI payment percentage is based on a scale of between 0% to 200% corresponding to the RSP / LTI compensation components granted to the individual Executive Board member.

If the term of office of a new Executive Board member starts during a fiscal year, the entitlement to the RSP / LTI is granted on a pro rata temporis basis. When calculating the overall target achievement for fiscal years in which the new member did not serve on the Executive Board or only served for part of the year, target achievement for the two performance criteria (adjusted EBIT and TSR) is set at 100%. For those years in which the individual served a full year on the Executive Board, the actual target achievement for the year is used.

If an RSP / LTI is granted for the reporting period, settlement takes the form of a taxable cash payment, which is earmarked in full for the purchase of MTU shares; these are subject to a four-year lock-up period.

Further rules on compensation

All Executive Board members appointed prior to fiscal year 2021 received direct defined benefit pension commitments. The structure of these commitments is outlined below in the section "Rules when terminating the contracts of Executive Board members." Instead of such defined benefit entitlements, in the future, newly appointed Executive Board members will receive an annual pension allowance as a contribution to a pension plan.

Further, the compensation system for the Executive Board contains penalty and claw-back rules. This enables the Supervisory Board, at its discretion, to reduce performance-related components that have not been paid out (penalty clause) or claim reimbursement of performance-related components that have already been paid (claw-back clause). The penalty and claw-back clauses take effect in cases of serious breaches of contract (Code of Conduct or compliance guidelines) and retrospective adjustment of performance-related compensation components that have been determined and/or paid on the basis of inaccurate consolidated financial statements if the amended consolidated financial statements would have resulted in a lower payment.

The share ownership guidelines require the CEO and the other members of the Executive Board to acquire shares in MTU equivalent to 300% (CEO) and 200% (other Executive Board members) respectively of their gross annual basic salary within four years. Shares acquired through the RSP are included. All Executive Board members fulfilled this individual obligation in the reporting period. The shares held in compliance with the share ownership guidelines are subject to a two-year lock-up period when a member leaves the Executive Board.

Under Section 87a (2) sentence 2 of the German Stock Corporation Act (AktG), in specific exceptional circumstances (e.g. in the event of a serious financial or economic crisis), the Supervisory Board may temporarily depart from the defined compensation system if this is in the long-term interests of MTU. General unfavorable market developments explicitly do not constitute specific exceptional circumstances permitting temporary departure from the compensation system. Departure from the compensation system is only possible on the basis of a corresponding resolution by the Supervisory Board, based on a proposal by the Personnel Committee, after careful examination of its necessity. Even in such cases, the compensation must still be geared to the long-term and sustainable development of MTU and reflect the success of the company and the performance of the Executive Board.

The components of the compensation system where such departures are permitted in the circumstances outlined above are the performance criteria for the STI and RSP and their weighting, the ranges for possible achievement of the targets and the methods used to determine target achievement. Similarly, the Supervisory Board can temporarily grant additional compensation components or replace individual compensation components by other compensation components if the incentive effect of the compensation of the Executive Board cannot be achieved adequately by adjusting the existing compensation components.

In accordance with Section 87a (1) sentence 2 no. 1 of the German Stock Corporation Act (AktG), the Supervisory Board has set a maximum level of compensation for each member of the Executive Board. This comprises all fixed and variable components (fixed compensation, fringe benefits, pension arrangements, STI, and RSP / LTI). The maximum compensation caps the total compensation granted for a fiscal year, irrespective of the time of payment. It is €5.5 million for the Chairman of the Executive Board and €3.0 million for the other Executive Board members and thus unchanged from the previous year.

Development of performance-related components

Short-term incentive (STI)

The Supervisory Board set the following performance targets for the short-term incentive (STI) for the reporting period: adjusted EBIT of €560 million (actual: €655 million) and free cash flow (FCF) of €240 million (actual: €326 million). Consequently, the entry threshold for target achievement for the STI was exceeded in the reporting period and the payment percentage was therefore 200% (previous year: 200%). With regard to the performance targets set for 2022 at the end of 2021 and their review in early 2022 when the financial statements were prepared, the highly volatile macroeconomic situation and the sector-specific development have to be taken into account. The beginning of 2022 was clearly overshadowed by the pandemic-driven crisis and its impact on international supply chains. This was exacerbated by the development of energy prices, along with the related inflation and the expected impact on demand, as well as the geopolitical tension arising from Russia's threat to Ukraine, which escalated into an invasion by Russia in February.

As ESG targets for the reporting period, the Supervisory Board defined the areas of environmental management (criterion: ESG target "CO_2", which is focused on reducing CO_2 emissions in the operation of the sites) and attractiveness as an employer and employees & diversity (criterion: "commitment and leadership"). A target range of 80 – 120% was set for each of these criteria. Both criteria are included with an equal weighting in the determination of the ESG multiplier.

Target achievement for the "CO_2" criterion is still measured on the basis of MTU''s Europe-wide climate protection strategy, the ecoRoadmap, which aims to achieve climate-neutral production and maintenance activity at MTU's sites or to systematically reduce their CO_2 emissions. The most important elements of this multi-faceted strategy are: higher energy efficiency, captive generation of sustainable energy at the site, procurement of low-emission energy sources such as green electricity, and emissions compensation. By setting specific climate goals, MTU wants to play a part in achieving the Paris climate targets.

The CO_2 criterion takes into account, as subcomponents, remaining CO_2 emissions as "maximum remaining CO_2 emissions" and "CO_2 abatement through sustainable measures." In view of the capacity-intensive requirements relating to the measurement and review of CO_2, this criterion is determined for a 12-month performance period of December 1, 2021 through November 30, 2022. Consequently, the performance period differs from the reporting period. Target achievement for the subcomponent "CO_2 abatement through sustainable measures'" is determined using the emission factors for baseline year 2019. Target achievement for the subcomponent "maximum remaining CO_2 emissions" is determined on the basis of the emission factors valid during the reporting period. These two subcomponents are considered separately and, in particular, not cumulatively. Target achievement is measured cumulatively for MTU's European sites in Munich, Hanover, Ludwigsfelde and Rzeszów.

For the subcomponent "maximum remaining CO_2 emissions," the Supervisory Board defined 54 kt remaining CO_2 emissions as 100% target achievement in the reporting period. For the component "CO_2 abatement through sustainable measures," the Supervisory Board defined a reduction in CO_2 compared with the baseline year (2019) as the basis for 100% target achievement. Based on the assured data for the baseline year 2019, a calculated reduction of 1.75 kt CO_2 was defined by the Supervisory Board. Furthermore, the Supervisory Board has decided that the target achievement for the components of the ESG target "CO_2" will be measured respectively within a range of 70% to 130% by means of linear interpolation. Target achievement for the ESG target "CO_2" is derived as the arithmetic mean of the target achievement of the subcomponents, with a minimum CO_2 target achievement of 80% and a maximum target achievement of 120%.

Thanks to reduction of CO_2 emissions and the additional purchase of green power, the "maximum remaining CO_2 emissions" for the relevant performance period of the reporting period were just 44 kt CO_2, which was 18.5% less than the target of 54 kt CO_2. Therefore, the corresponding target achievement is 119%. Moreover, as a result of operational measures and investments in the reporting period and previous periods, a calculated reduction of 2.00 kt CO_2 was achieved in the performance period for the component "CO_2 abatement through sustainable measures. That was 14.5% above the target of 1.75 kt CO_2, so the corresponding target achievement level is 115%. The arithmetic mean of the target achievement of each of the subcomponents gives a target achievement level of 117% for the ESG target "CO_2" in the reporting period.

Achievement of the target for the "commitment & leadership" criterion is derived from employee feedback in the reporting period, based on employee surveys at MTU's German locations ("pulse checks"). For this purpose, the number of explicitly positive replies to defined questions on commitment & leadership are counted and expressed as a percentage of the total number of replies. As defined by the Supervisory Board, the total index value calculated in this way is weighted with a target achievement level of 80% for a score of 60%, 100% for a score of 75% ,and 120% for a score of 90%.

The total index value for 2022 derived from the two pulse checks during the year was around 77%, so the target achievement level for the "commitment & leadership" criterion was 102%.

The target achievement levels of 117% for the ESG target "CO_2" and 102% for the "commitment & leadership" target give an arithmetic mean of 109.5% and an ESG multiplier of 1.095.

In combination with the achievement of the financial targets of relevance for the STI, i.e., adjusted EBIT and free cash flow (payment percentage 200%), and the non-financial targets, i.e., reduction of emissions in the operation of the locations and "commitment & leadership" (ESG multiplier 1.095), the effective STI payment percentage for the reporting period is 219%.

Restricted Stock Plan (RSP)/Long-term incentive (LTI)

The value of the Restricted Stock Plan (RSP or LTI – long-term incentive) is based on the contractually agreed RSP grant value and the realized multi-year performance level. The latter is calculated for each Executive Board member in the reporting period as the arithmetic mean of the target achievement of the adjusted EBIT and the relative total shareholder return (TSR) measured against the STOXX® Europe Total Market Aerospace and Defense in the reporting period as well as the two previous years.

Achievement of the LTI performance targets developed as follows:

[T9] Achievement of the LTI performance targets in 2022

	2022	2021	2020
Adjusted EBIT			
Target level in € million	560	400	800
Actual level in € million	655	468	416
Adjusted EBIT performance (in % of target level)	116.96%	117.03%	51.95%
Achievement adjusted EBIT target in %	184.80%	185.15%	0.00%
Three-year average of target achievement adjusted EBIT in %	**123.32%**		
Relative total shareholder return (TSR)			
TSR performance MTU in %	17.25%	-15.15%	-17.37%
TSR performance reference index in %	18.47%	5.43%	-24.89%
Delta TSR in percentage points	-1.22%	-20.58%	7.52%
TSR target achievement in %	93.90%	0.00%	175.20%
Three-year average of target achievement TSR in %	**89.70%**		
Total target achievement (three-year average)	**106.51%**		

The performance-related compensation component RSP / LTI granted for the reporting period on the basis of multi-year target achievement is paid in the following year.

The next table shows the basis for determining the multi-year target achievement level for the performance-related components:

[10] Variable compensation payment percentages

	2022	2021	2020 [1]	2019 [1]	2018 [1]
STI	219.00	218.00		180.00	160.80
RSP / LTI	106.51	116.84	173.60	164.87	168.14
Price of RSP shares purchased					
Purchase price per share	N. N. [2]	209.50	119.20	209.20	143.30

[1] Payment percentage calculated on the basis of the compensation system applicable up to and including fiscal year 2020.
[2] The RSP / LTI compensation components will only be paid out in 2023 so the purchase price per share will not be set until after preparation of this compensation report.

Compensation of individual members of the Executive Board

In the year under review, Reiner Winkler asked the Supervisory Board to end his appointment to the Executive Board (CEO) prematurely as of December 31, 2022, without any termination payment. The Supervisory Board eventually accepted his request and appointed the Chief Operating Officer, Lars Wagner, as new CEO effective January 1, 2023. Further, the Supervisory Board appointed Dr. Silke Maurer as new Chief Operating Officer. Her appointment took effect, in compliance with Section 76 (3a) of the German Stock Corporation Act (AktG), on February 1, 2023.

Compensation for the reporting period

The following table contains an individual breakdown of the compensation of each Executive Board member for the reporting period. The non-performance-related compensation is reported as compensation granted and corresponds to the amounts paid in the reporting period.

The performance-related compensation is presented as compensation granted and owed and corresponds to the expected amount of performance-related compensation based on the audited consolidated financial statements for the reporting period.

[T11] Total compensation granted and owed

Members of the Executive Board	**Reiner Winkler** Chief Executive Officer	**Peter Kameritsch** Chief Financial Officer and Chief Information Officer	**Michael Schreyögg** Chief Program Officer	**Lars Wagner** Chief Operating Officer	**Total**
in €	2022	2022	2022	2022	2022
Fixed compensation	999,996	600,000	600,000	600,000	2,799,996
Fringe benefits [1]	21,352	9,624	28,024	13,906	72,906
Total non-performance-related compensation	**1,021,348**	**609,624**	**628,024**	**613,906**	**2,872,902**
Proportion of non-performance-related compensation in %	**27%**	**31%**	**32%**	**31%**	
STI [2]	1,642,500	788,400	788,400	788,400	4,007,700
RSP / LTI [2]	1,171,610	575,154	575,154	575,154	2,897,072
Total performance-related compensation	**2,814,110**	**1,363,554**	**1,363,554**	**1,363,554**	**6,904,772**
Proportion of performance-related compensation in %	**73%**	**69%**	**68%**	**69%**	
Total compensation granted and owed	**3,835,458**	**1,973,178**	**1,991,578**	**1,977,460**	**9,777,674**
Service cost (IAS 19)	257,809	149,132	133,115	320,096	860,152
Total compensation	**4,093,267**	**2,122,310**	**2,124,693**	**2,297,556**	**10,637,826**

[1] Fringe benefits include charges to taxable income covering benefits in kind amounting to €62,877 and premiums for insurance policies taken out on behalf of members of the Executive Board amounting to €6,415 and membership contributions amounting to €3,613.

[2] The performance-related compensation granted for the reporting period will be paid out in the following year, after adoption of the consolidated financial statements.

Members of the Executive Board did not receive any compensation for supervisory board and similar appointments at Group companies. The Group did not grant any loans to members of the Executive Board in the reporting period or the previous year. The compensation of the Executive Board did not have to be adjusted due to a penalty or clawback ruling in either the reporting period or the previous year. Moreover, there was no need to temporarily depart from the defined compensation system due to specific exceptional circumstances. The agreed maximum compensation of €5.5 million for the CEO and €3.0 million for each of the other Executive Board members was not exceeded in any case.

Former Executive Board member Dr. Rainer Martens received a pension of €303,589 in the reporting period on the basis of the direct defined benefit commitment relating to his service on the Executive Board.

The table shows the change in the individual compensation of the Executive Board and Supervisory Board members, the earnings indicators for the company and the Group and the average compensation of the workforce. It should be noted that the compensation of the CEO and the other members of the Executive Board is composed to a large extent of performance-related components.

Moreover, the review of the target direct compensation of Executive Board members is performed on a multi-year basis and not on a one-year basis, as is the case for the rest of the workforce. Further it is always benchmarked using a comparison within the relevant stock market segment; MTU has been included in the DAX segment since 2019.

[T12] Vertical comparison

	2022	Change 2022 vs. 2021	2021	Change 2021 vs. 2020	2020	Change 2020 vs. 2019	2019	Change 2019 vs. 2018	2018
Compensation granted and owed to Executive Board members active in the reporting period									
Reiner Winkler	3,835,458	11%	3,464,780	37%	2,532,607	–31%	3,648,813	20%	3,031,084
Peter Kameritsch	1,973,178	9%	1,812,449	31%	1,379,276	–28%	1,926,888	52%	1,270,636 [1]
Michael Schreyögg	1,991,578	9%	1,830,669	31%	1,395,212	–28%	1,940,722	2%	1,894,915
Lars Wagner	1,977,460	9%	1,809,566	32%	1,374,109	–28%	1,919,319	52%	1,266,551 [1]
Earning indicators									
Adjusted Group EBIT (IFRS)	655	40%	468	13%	416	–45%	757	13%	671
Net profit of MTU Aero Industries AG (German Commercial Code [HGB]) [2]	267	35%	198	50%	132	64%	80	–69%	262
Average compensation of the worldforce									
Employees in Germany [3]	88,870	2%	87,118	8%	81,035	–7%	86,922	1%	85,820

[1] Executive Board member since January 1, 2018.
[2] Not relevant for compensation; does not provide a very meaningful insight into the economic development of MTU Group.
[3] Includes the active workforce in Germany (permanent employees, including employees on parental leave working part-time) standardized to full-time equivalents (FTEs) based on the following compensation elements: performance-unrelated basic salary and, depending on employment group, collectively agreed one-time payments or performance-related variable compensation (profit-sharing bonus, bonuses I and II, STI and RSP/ LTI).

[T13] Vertical comparison

	Change 2022 vs. 2021	Change 2021 vs. 2020	Change 2020 vs. 2019	Change 2019 vs. 2018
Compensation of former Executive Board members				
Dr. Rainer Martens	34%	– [1]		
Dr. Stefan Weingartner	–100% [2]	– [2]		
Compensation granted and owed to present Supervisory Board members				
Gordon Riske (Chairman of the Supervisory Board, Personnel Committee and Nomination Committee) (since May 5, 2022)	-			
Klaus Eberhardt (Chairman of the Supervisory Board, Personnel Committee and Nomination Committee) (Supervisory Board member until May 5, 2022)	–47%	–6%	9%	1%
Josef Mailer (Deputy Chairman of the Supervisory Board)	74%	–6%	1%	–1%
Dr. Joachim Rauhut (Chairman of the Audit Committee)	85%	–5%	–6%	1%
Roberto Armellini (Supervisory Board member between June 13, 2019 and July 31, 2022)	–2%	–4%	79%	-
Dr. Christine Bortenlänger (member of the Audit Committee since April 22, 2021)	97%	17%	–9%	35%
Thomas Dautl	67%	3%	–9%	0%
Daniele Frijia (Supervisory Board member since August 17, 2022)	-			
Dr.-Ing. Jürgen M. Geißinger	49%	2%	2%	–3%
Anita Heimerl	67%	0%	–7%	105%
Heike Madan	81%	–6%	–7%	2%
Dr. Rainer Martens (Supervisory Board member since January 26, 2021)	77%	-		
Univ. Prof. Dr. Marion A. Weissenberger-Eibl	67%	3%	–9%	0%
Michael Winkelmann (Supervisory Board member since May 1, 2020)	67%	48%	-	

[1] First-time payment in fiscal year 2021.
[2] One-time payment in fiscal year 2021.

In view of the extensive operating activities of the national companies in the MTU Group, considerations on retaining earnings at national companies for business policy reasons, and the fact that MTU Aero Industries AG performs central tasks for the MTU Group, for example financing and its role as a tax group, the net profit of MTU Aero Engines AG calculated in accordance with the German Commercial Code (HGB) is not a good reflection of the performance of the MTU Group. Consequently, the net profit of MTU Aero Engines AG is not a suitable reference base for performance-related compensation components, which regularly take into account financial and non-financial targets for the Group. Therefore, the adjusted EBIT for the Group is included in the vertical comparison as an additional earnings indicator as it is used as the financial performance indicator for the performance-oriented compensation components of both the Executive Board and the entire workforce in Germany. In all compensation groups evaluated, the calculation of the annual changes in compensation excludes company pension schemes.

Rules when terminating the contracts of members of the Executive Board

In the reporting period, the active members of the Executive Board were granted defined benefit commitments whose structure corresponds to that of pension commitments for members of governing bodies of peer-group companies. Executive Board members appointed from January 1, 2021 receive a pension allowance as a contribution to a pension plan, paid out annually in cash, instead of the pension commitment outlined above. This enables Executive Board members to take responsibility for building up their personal pension provision at their own discretion. Granting a pension allowance relieves MTU of the opportunities and risks related to defined benefit commitments.

Defined benefit commitments for retirement and survivors' pensions

The active members of the Executive Board – provided they were appointed before fiscal year 2021 – earn company pension entitlements in the fiscal year in accordance with the "MTU Pension Capital" plan, which governs the post-employment benefits for members of the Executive Board of MTU Aero Engines AG. The benefit target is to provide a pension amounting to 60% of the basic salary after 15 years of service on the Executive Board.

When the previous plan was replaced, the benefits earned up until December 31, 2009, were transferred to the new plan as the initial transfer amount. This entitlement represents the benefits payable under the old plan at the age of 60, adjusted by the ratio of actual years of service with the Group to the number of years from joining the Group until the age of 60. The initial transfer amount corresponds to the pension equivalent converted into a one-time capital amount.

Once the initial transfer amount has been determined, a pension account is opened for each member of the Executive Board, to which further capital units are credited annually. The annual capital units are determined on the basis of the individual Executive Board member's contribution and an age-related factor. The age-related factor represents an interest rate of 6% p.a. until the age of 60. The contribution period is normally limited to 15 years of service on the Executive Board and ends at the age of 60. From the age of 61, the pension account earns interest at 4% p.a. until the pension is drawn (= bonus amount). The total of accrued capital units, plus the initial transfer amount and any bonus amounts credited, make up the pension capital available to finance post-employment benefits.

If benefits are payable because a member of the Executive Board becomes disabled or dies before reaching the fixed retirement age of 60, 50% of the benefits earnable up to the fixed age limit are added to the accrued balance on the pension account, taking into account the promised contribution period. The amount credited is based on the contribution paid at the time of exit.

When an insured event occurs, the pension capital is generally granted as a one-time payment. At the request of the Executive Board member and subject to the Group's approval already granted, a lifelong annuity may be granted, based on interest of 6% on the pension capital and benefit increases of 1% p.a. Alternatively, at the request of the Executive Board member, the capital may be drawn in 10 installments, with a 4% increase in the capital balance. When an insured event occurs, the pension account is topped up to the level of benefit commitment under the previous plan (guaranteed capital). Pension benefits do not become payable until an insured event occurs (i.e., on reaching pensionable age, or in the event of disability or death), even if the insured party leaves the Executive Board. The pension entitlement is vested from inception.

Basic details of the above-mentioned commitments and benefits are shown in the following table:

[T14] Existing post-employment benefit entitlements

Members of the Executive Board in €	Initial transfer amount [1]	Guaranteed capital [2]	Annual contribution	End of contribution period	Annual pension amount [3]
Reiner Winkler	1,625,140 [4]	2,510,788	0	1.8.2021 [5]	598,641
Peter Kameritsch	461,573	461,573	258,072	1.4.2029	303,253
Michael Schreyögg	365,627	365,627	275,975	1.8.2026	337,719
Lars Wagner	207,344	207,344	237,124 [6]	1.1.2033	484,513

[1] Credit for past service up to date of changeover to new system – Reiner Winkler: December 31, 2009; Michael Schreyögg: July 1, 2013; Peter Kameritsch and Lars Wagner: January 1, 2018.
[2] Level of benefits to which the insured party would have been entitled under the previous pension plan.
[3] All entitlements to company pension benefits (excluding the individual employee-funded capital account ["Pension Capital Aufbaukonto"]) taking into account the maximum contribution period. In addition, Peter Kameritsch and Lars Wagner are entitled to pension capital from deferred compensation of €772,675 at age 60 and €139,600 at age 62, respectively.
[4] Under the previous pension plan, Reiner Winkler was promised that his years of service with former Group companies would count toward his pension. In connection with the transfer of his pension entitlements to the new plan, he was promised a special transfer amount of €575,065 in 2010.
[5] As part of the contract extension in 2018, the contribution period was extended to the age of 60.
[6] This contribution will change in 2022 in line with the adjustment to the fixed compensation adopted in the reporting period with effect from January 1, 2023.

The differences in the annual contributions to the pension accounts result from the remaining periods of service until the end of the respective maximum contribution period, the respective age-related factors, and the individual amounts of pensionable compensation.

The following table shows the service cost for the reporting period and the previous year, and the corresponding levels of provisions, recognized in accordance with IFRS for members of the Executive Board:

[T15] Allocations to pension provisions and total amounts recognized

Members of the Executive Board in €	Year	Service cost (IFRSs)	Carrying amount of pension provisions as of Dec. 31 (IFRSs) [1]
Reiner Winkler	**2022**	**257,809**	**11,453,200**
	2021	260,938	8,711,581
Peter Kameritsch	**2022**	**149,132**	**4,593,904**
	2021	379,670	4,275,046
Michael Schreyögg	**2022**	**133,115**	**5,300,916**
	2021	415,951	4,423,074
Lars Wagner	**2022**	**320,096**	**2,264,977**
	2021	469,147	2,254,645
Total	**2022**	**860,152**	**23,612,997**
Total	**2021**	**1,525,706**	**19,664,346**

[1] Where appropriate, the provisions include obligations relating to claims arising from the individual employee-funded capital accounts ("Pension Capital Aufbaukonto") from previous service periods.

The defined benefit obligations for former members of the Executive Board, measured in accordance with International Financial Reporting Standards (IFRSs), amount to €9,542,940 (previous year: €14,446,429).

Severance payments on premature termination of contracts of service with members of the Executive Board

If the appointment of an Executive Board member is terminated by MTU for cause and termination of the contract takes place with immediate effect, the STI or RSP/ LTI will not be paid for that fiscal year. If the contract of service is terminated by MTU or the Executive Board member subject to the period of notice, the Executive Board member is entitled to a pro-rata STI or RSP/ LTI payment for the remaining term of the contract.

If, before the end of the holding period for shares under the RSP, the Executive Board member's contract of service ends as a result of extraordinary termination by MTU for cause pursuant to Section 626 (1) of the German Civil Code (BGB) or due to the resignation of the Executive Board member without reaching mutual agreement, or if the appointment is revoked by the Supervisory Board for cause pursuant to Section 84 (3) of the German Stock Corporation Act (AktG) before the end of the holding period, or if the Executive Board member resigns before the end of the holding period, the Executive Board member must refund the (gross) value of the RSP that has been paid out.

Severance payments on premature termination of contracts of service with members of the Executive Board in the event of a change of control or changes of shareholders of MTU Aero Engines AG

Under the contracts of service for members of the Executive Board in effect since January 1, 2021, a change of control is deemed to have occurred if a shareholder, alone or on the basis of the voting rights attributable to him or her pursuant to Section 22 of the German Securities Trading Act (WpHG), acquires the majority of the voting rights and this results in significant disadvantages for the Executive Board. Material disadvantages are, in particular, if the Executive Board member is removed, if the member's responsibilities and duties are significantly altered, or if the Executive Board member is asked to accept a reduction in employment benefits or to agree to premature termination of the respective contract of service. In such case, each member of the Executive Board shall have a special right of termination, which is to be exercised within a period of six months, with a period of notice of three months to the end of a month. If a member of the Executive Board makes use of the special right of termination, or if the Executive Board member's contract of service is terminated by mutual consent within nine months of the change of control, the Executive Board member receives a severance payment corresponding to the benefits still to be awarded up to the end of the contract term originally agreed. For the calculation of the severance payment, 100% target fulfillment is agreed for the variable compensation components.

Severance payments made to a member of the Executive Board as a result of early termination of their contract, including in the event of a change of control, are always limited to two years' total annual compensation (cap on termination benefits) or the compensation due for the remaining term of the contract, whichever is lower.

Compensation of the Supervisory Board

The rules governing Supervisory Board compensation are laid down in the articles of association of MTU Aero Engines AG. The compensation is relative to the size of the Group and the duties and responsibilities of the Supervisory Board members.

Pursuant to Article 12 of the current articles of association of MTU Aero Engines AG, members of the Supervisory Board receive fixed annual compensation of €80,000, payable after the end of the fiscal year. The chair of the Supervisory Board receives three times and the deputy one-and-a-half times the amount of fixed compensation. In addition to this compensation, members serving on one of the Supervisory Board's committees receive an additional €20,000 for the fiscal year and a further €40,000 for the fiscal year if they chair a committee. Furthermore, members of the Supervisory Board receive an attendance fee of €3,000 per meeting of the Supervisory Board and its committees, limited to €3,000 per day. Expenses incurred in connection with the exercise of their office are reimbursed, as is any value-added tax payable on compensation. The members of the Supervisory Board do not receive any share-based compensation.

The following table contains an individualized breakdown of the compensation of each Supervisory Board member in the reporting period (figures exclude value-added tax). The fixed annual payment and compensation for committee membership are disclosed as compensation owed and comprise the compensation for the reporting period paid out at the start of the following year.

The attendance fees are disclosed as compensation granted and are the amounts paid to each member in the reporting period.

[T16] Compensation granted and owed to the Supervisory Board for 2022

Supervisory Board members	Fixed annual payment		Compensation for membership in committee		Attendance fees		Total compensation	
	in €	in %	in €	in %	in €	in %	in €	in %
Gordon Riske (Chairman of the Supervisory Board, Personnel Committee and Nomination Committee) (since May 5,2022) [2]	157,333	67%	59,000	25%	18,000	8%	234,333	100%
Klaus Eberhardt (Chairman of the Supervisory Board, Personnel Committee and Nomination Committee) (until May 5, 2022) [2]	83,333	67%	31,250	25%	9,000	7%	123,583	100%
Josef Mailer (Deputy Chairman of the Supervisory Board) [1] [2] [4]	120,000	60%	40,000	20%	39,000	20%	199,000	100%
Dr. Joachim Rauhut (Chairman of the Audit Committee)	80,000	45%	60,000	34%	36,000	20%	176,000	100%
Roberto Armellini (until July 31, 2022) [1] [4]	46,667	66%	11,667	17%	12,000	17%	70,333	100%
Dr. Christine Bortenlänger [2]	80,000	59%	20,000	15%	36,000	26%	136,000	100%
Thomas Dautl	80,000	79%			21,000	21%	101,000	100%
Daniele Frijia (since August 17, 2022) [1] [4]	29,778	60%	7,444	15%	12,000	24%	49,222	100%
Dr.-Ing. Jürgen M. Geißinger [1] [3]	80,000	61%	30,000	23%	21,000	16%	131,000	100%
Anita Heimerl [4]	80,000	79%			21,000	21%	101,000	100%
Heike Madan [2] [4]	80,000	59%	20,000	15%	36,000	26%	136,000	100%
Dr. Rainer Martens	80,000	79%			21,000	21%	101,000	100%
Univ. Prof. Dr. Marion A. Weissenberger-Eibl	80,000	79%			21,000	21%	101,000	100%
Michael Winkelmann [4]	80,000	79%			21,000	21%	101,000	100%
Total	**1,157,111**		**279,361**		**324,000**		**1,760,472**	

[1] Member of the Personnel Committee.
[2] Member of the Audit Committee.
[3] Member of the Nomination Committee.
[4] These employee representatives have declared that they will donate their Supervisory Board compensation to the Hans-Böckler-Stiftung, in accordance with the guidelines of the Confederation of German Trade Unions.

Perspective for fiscal year 2023

The compensation system for members of the Executive Board and Supervisory Board is to be retained unchanged in fiscal year 2023. The targets for the performance-related compensation components for the Executive Board for 2023 will be set in parallel with the preparation of the compensation report and the audited consolidated financial statements for 2022. In view of the sensitivity of the forecasts on which the targets are based, in keeping with the procedure used in the year under review and previous periods, they will be published in the compensation report 2023. These targets are naturally consistent with the forward-looking statements (Forecast) in the management report in the Annual Report 2022.

Independent auditor's report

To MTU Aero Engines AG, Munich

We have audited the attached remuneration report of MTU Aero Engines AG, Munich, prepared to comply with Sec. 162 AktG ["Aktiengesetz": German Stock Corporation Act] for the fiscal year from 1 January 2022 to 31 December 2022 and the related disclosures.

Responsibilities of the executive directors and the supervisory board

The executive directors and supervisory board of MTU Aero Engines AG, Munich, are responsible for the preparation of the remuneration report and the related disclosures in compliance with the requirements of Sec. 162 AktG. In addition, the executive directors and supervisory board are responsible for such internal control as they determine is necessary to enable the preparation of a remuneration report and the related disclosures that are free from material misstatement, whether due to fraud or error.

Auditor's responsibility

Our responsibility is to express an opinion on this remuneration report and the related disclosures based on our audit. We conducted our audit in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer [Institute of Public Auditors in Germany] (IDW). Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the remuneration report and the related disclosures are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts in the remuneration report and the related disclosures. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the remuneration report and the related disclosures, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the preparation of the remuneration report and the related disclosures in order to plan and perform audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the accounting policies used and the reasonableness of accounting estimates made by the executive directors and supervisory board, as well as evaluating the overall presentation of the remuneration report and the related disclosures.

We believe that the evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Opinion

In our opinion, on the basis of the knowledge obtained in the audit, the remuneration report for the fiscal year from 1 January 2022 to 31 December 2022 and the related disclosures comply, in all material respects, with the financial reporting provisions of Sec. 162 AktG.

Other matter – formal audit of the remuneration report

The audit of the content of the remuneration report described in this auditor's report comprises the formal audit of the remuneration report required by Sec. 162 (3) AktG and the issue of a report on this audit. As we are issuing an unqualified opinion on the audit of the content of the remuneration report, this also includes the opinion that the disclosures pursuant to Sec. 162 (1) and (2) AktG are made in the remuneration report in all material respects.

Limitation of liability

The "General Engagement Terms for Wirtschaftsprüfer and Wirtschaftsprüfungsgesellschaften [German Public Auditors and Public Audit Firms]" as issued by the IDW on 1 January 2017, which are attached to this report, are applicable to this engagement and also govern our responsibility and liability to third parties in the context of this engagement.

Munich, 21 March 2023

Ernst & Young GmbH
Wirtschaftsprüfungsgesellschaft

Baur Wirtschaftsprüfer [German Public Auditor]	Stummer-Jovanovic Wirtschaftsprüfer [German Public Auditor]

Combined management report

Combined management report

The management report of MTU Aero Engines AG and the Group management report for the fiscal year 2022 have been combined in accordance with Section 315 (5) of the German Commercial Code (HGB) in conjunction with Section 298 (2) of the German Commercial Code (HGB).

The MTU Group

Business activities and markets

MTU's portfolio covers the entire lifecycle of commercial and military aircraft engines and aero-derivative industrial gas turbines. The company's activities range from development, manufacturing and marketing to maintenance.

MTU has technological expertise in low-pressure turbines, high-pressure compressors and turbine center frames, and in repair techniques and manufacturing processes. It is involved in important national and international technology programs and cooperates with the top names in the industry (GE Aerospace, Pratt & Whitney and Rolls-Royce).

The Group also provides maintenance services for commercial aircraft engines. In the military sector, it has been the leading industrial partner to the German armed forces for decades.

MTU operates in two segments: the OEM business (Original Equipment Manufacturing) and MRO business (Maintenance, Repair and Overhaul). The OEM segment covers new commercial engines, including spare parts, and the whole of the military sector.

The MRO segment comprises the commercial maintenance activities.

Group structure, locations and organization

Through its subsidiaries, joint ventures and equity investments, MTU has a presence in all key markets and regions worldwide. Further information on MTU's shareholdings is provided in the Notes to the consolidated financial statements in *Section I. "Accounting policies and principles".*

[T17] MTU Aero Engines worldwide

MTU Maintenance Canada

MTU Aero Engines North America

MTU Maintenance Dallas

MTU Maintenance do Brasil

MTU Aero Engines

MTU Maintenance Hannover

MTU Maintenance Berlin-Brandenburg

MTU Maintenance Lease Services

MTU Aero Engines Polska

MTU Maintenance Serbia

EME Aero[1)]

AES Aerospace Embedded Solutions[1)]

Pratt & Whitney Canada Customer Service Centre Europe[1)]

Ceramic Coating Center[1)]

MTU Maintenance Zhuhai[1)]

Airfoil Services[1)]

[1)] Joint ventures.

[T18] MTU's global workforce

Number of employees	Dec. 31, 2022	Dec. 31, 2021	Change against previous year: Employees	Change against previous year: in %
Locations in Germany	9,155	8,739	416	4.8
Locations outside Germany	2,118	1,769	349	19.7
Total workforce	**11,273**	**10,508**	**765**	**7.3**

Corporate strategy

MTU's corporate strategy is geared to profitable growth, customer satisfaction and sustainability. In addition to financial indicators, it therefore takes ecological and social aspects into account. The four target areas of MTU's growth strategy are:

A balanced product portfolio – Participation in rapidly growing new programs

MTU focuses on rapidly growing and high-volume commercial and military engines and works with various partners. It optimizes its risk profile and growth opportunities through continuous participation in varying thrust classes and fields of application. MTU Aero Engines is currently focusing on ramping up production of Geared Turbofan™ engines for regional and medium-haul jets, which it has developed together with partners, where the ramp-up has been delayed by the Covid-19 crisis. At the same time, it is concentrating on the ongoing development of this engine as the Pratt & Whitney GTF Advantage™ and on developing GE Aerospace's GE9X engine program for the Boeing 777X widebody aircraft. There will also be a cargo version of the aircraft. MTU's solid positioning in the MRO segment is partly due to these programs, as the company has secured itself a share of the future aftermarket service business through its stakes in these engine programs.

In the commercial maintenance business, the company is driving forward the expansion of its portfolio of products and services, including digital services, to enhance customer satisfaction and continuously broaden its customer base.

In the military business, at the end of 2022, Germany, France and Spain approved the contract for the new FCAS (Future Combat Air System) air defense system and granted the required formal approvals. The industrial partners on the engine side can therefore embark on the actual development phase of the NEFE (Next European Fighter Engine). Together with its partners, Safran Aircraft Engines (Paris, France) and ITP Aero (Zamudio, Spain), MTU will be working on the development of pioneering technologies in the coming years, which will require a substantial increase in its development team.

Good progress was also made with the development of the new digital engine control & monitoring unit (DECMU) for the EJ200 program. DECMU will replace the previous technology and therefore help to secure the future of this engine and support the future development of the aircraft and engine as part of the long-term evolution (LTE) of the Eurofighter.

Cutting-edge technologies – Maintaining and expanding technological leadership

MTU is currently extending its technological leadership by focusing on the ongoing development of gas turbines for aircraft, for example, using new materials such as 6th generation monocrystals or metal powders for turbines and modern manufacturing technologies such as additive processes. In combination with optimized cyclic processes, the aim for the mid term is to raise the efficiency of MTU's core modules – the low-pressure turbine, high-pressure compressor and turbine center frame – and reduce their weight, in order to increase profitability and environmental friendliness.

In line with the overriding objective of the Paris Agreement on Climate Change, specific targets are being defined for aviation. One example is the recent publication of ACARE Flightpath 2050 "Fly the Green Deal." Alongside a specific CO_2 target, this sets targets for non-CO_2 effects, for example due to emissions of nitrogen oxides and the formation of condensation trails. MTU published a revised version of its Claire (Clean Air Engine) technology agenda in 2022. The declared aim is to bring onto the market products that enable climate-neutral or emission-free flying well before 2050. MTU is therefore stepping up research into future-oriented propulsion concepts, together with its partners in industry, science and research. Claire therefore defines time horizons, targets and possibilities for implementation for the three areas of aviation: short-, medium-, and long-haul flights. The water-enhanced turbofan (WET), a revolutionary gas turbine-based propulsion concept, can significantly reduce all emissions that impact the climate. In addition, MTU is working on the flying fuel cell concept for full electrification of the powertrain. A fuel cell converts liquid hydrogen into electricity, which is used to drive electric motors.

The aim is to develop both concepts as part of the national aviation research program and, in a European context, through Clean Aviation. For the flying fuel cell, MTU has embarked on a project with the German aviation research center (DLR) to develop an optimized fuel cell system for use in aviation. This project receives funding from national funding programs. The aim is to test a prototype on a Dornier Do228 in flight by the middle of this decade. The WET concept is being developed with partners under the auspices of the EU Clean Aviation funding program.

In addition to alternative propulsion systems, on the road to climate-neutral aviation, sustainable aviation fuels (SAFs) play an important role. They have the potential to significantly reduce the climate impact of aviation with the engines currently used in aircraft. MTU is therefore playing a part in this field, for example, as a founding member of the association aireg (Aviation Initiative for Renewable Energy in Germany e.V.) and as a strategic partner in several projects to set up SAF production facilities. Alongside technical improvements to products, the digitalization of products, services and value-creation processes is growing in importance. Here, MTU's activities are geared primarily to reducing lead times and expenses, for example in development by making extensive use of simulation techniques in all disciplines through to full integration in the virtual engine.

Enhanced competitiveness – Increased productivity accompanied by a reduction in capital tie-up

MTU encourages a culture of continuous improvement in order to secure its competitiveness and further increase customer satisfaction. The focus here is on optimizing structures, processes and capital tie-up in all areas of the company. Digitalization and automation technologies (Industry 4.0) play a key role here.

The goal is to continuously optimize MTU's supply chain and its production and service network in terms of delivery capability, quality and costs. Profitability and competitiveness are to be enhanced further by high investment in maintenance and repair shops in countries where wage costs are low.

A massive drive is underway to secure customer satisfaction through continuous adjustment of the product portfolio between service locations and the resulting flexibility.

MTU's most important task is fulfilling its delivery obligations. To this end, in 2021 and 2022 the Technology division introduced a lean matrix organization based on material flows. This comprises product-specific output centers focused on areas such as development, purchasing and manufacturing, and cross-functional support and competence centers. The matrix paves the way for a further improvement in collaboration, smooth processes and greater efficiency. Operations therefore used the period of lower capacity utilization during the pandemic to prepare optimally for the next ramp-up phase.

Alongside measures to improve productivity and customer satisfaction, in the future MTU will be stepping up its focus on reducing CO_2 emissions at its production locations. In 2022, the European locations MTU Maintenance Berlin-Brandenburg, MTU Maintenance Hannover and MTU Aero Engines Polska were included in the ecoRoadmap initiative, which was launched at the Munich location in 2021. There are plans to extend this to further sites. MTU regards responsible economic activity as an important criterion in its competitiveness, and acts in harmony with its sustainability strategy. Long-term competitiveness is supported by wide-ranging digitalization initiatives, in which process optimization and the use of new technologies such as artificial intelligence are closely linked with a balanced product portfolio and technological development.

Innovative corporate culture – Motivated employees in a creative environment

Highly motivated, skilled workers are crucial to the successful development of the MTU Group. MTU's corporate culture places emphasis on personal development and achievement coupled with a strong sense of social responsibility.

The trend toward digitalization is set to change the work environment and tried-and-tested management methods. More scope and greater responsibility for employees as well as short decision paths are key elements of an innovative corporate culture. All employees are encouraged and empowered to contribute their own ideas and translate them into new products and services, innovative business models and improved processes.

The company promotes cultural and individual diversity, flexible working conditions and high-quality basic and further training opportunities for its workforce.

The roadmap for the ongoing development of the corporate culture sets the following focal areas for the coming years: greater diversity and internationality, entrepreneurial action at all levels, a digital mindset, networking and community, and alignment with tomorrow's hybrid world of work. A broadly based survey was conducted in 2022 to assess progress with the innovative corporate culture. The results are being used as the basis for further focusing and for visualization of the future development of the culture. The initiatives and projects derived from this should accelerate the priority topics. The continuous development of the leadership values, innovation management and innovative corporate culture strengthens MTU's overarching corporate vision: "We shape the future of aviation."

Key performance indicators

MTU is managed on the basis of financial key performance indicators adopted by the Executive Board. These performance metrics are derived from corporate planning and provide guidance for management of the company that is geared to sustainable and profitable growth. In addition, attention is paid to ecological and social aspects. A planning, risk management and control system, accompanied by a value-oriented management compensation system, is to facilitate decisions that create a suitable environment for implementing the corporate strategy.

[T19] Performance indicators

in € million	2022	2021	Change against previous year in € million	Change against previous year in %
Revenue	5,330	4,188	1,143	27.3
Adjusted EBIT	655	468	187	39.9
Adjusted EBIT margin (in %)	12.3	11.2		
Net Income Adjusted	476	342	134	39.2
Free cash flow	326	240	86	35.8

The value-driving key performance indicators of adjusted EBIT, revenue and free cash flow define the range within which MTU operates in terms of profitability, growth and liquidity.

For a definition of adjusted EBIT, which is the central indicator of operational profitability, please see the *reconciliation to adjusted key performance figures in the "Results of operations" section*. Another indicator monitored by the company is the adjusted EBIT margin, which shows the relationship between adjusted EBIT and revenue.

For a definition of the free cash flow KPI, which MTU calculates from a combination of the cash flow from operating activities and investing activities, adjusted for non-recurring cash flows, please see the liquidity analysis in the *"Financial situation"* section.

[T20] Free cash flow

in € million	2022	2021	Change against previous year in € million	Change against previous year in %
Cash flow from operating activities	728	567	161	28.3
Cash flow from investing activities	-400	-345	-55	-15.9
Non-recurring cash flows	-2	18	-20	<-100
Free cash flow	**326**	**240**	**86**	**35.8**

Research and development

Framework conditions and goals

The Paris Agreement initiated a paradigm shift in aviation. While previous goals such as those set out by the Advisory Council for Aviation Research and Innovation in Europe in Flightpath 2050 focused exclusively on the direct CO_2 effects on the climate, in the future, the entire climate impact of aviation will be taken into consideration. That includes non-CO_2 effects such as the climate impact of emissions of nitrogen oxides and water, as well as the impact of condensation trails, which increase cloud formation. As an intermediate step towards meeting the goal of the Paris Agreement, the European Green Deal defines a 55% reduction in greenhouse gas emissions by 2030 and the achievement of climate neutrality by 2050. In July 2021, the European Commission presented the “Fit for 55” package containing measures to help achieve these targets. Examples are revising the European emissions trading system and the introduction of a minimum quota for the use of sustainable aviation fuels. Alongside such measures, there is a need, above all, for innovative solutions for aircraft and engines.

MTU has established technological leadership in its core competencies of low-pressure turbines, high-pressure compressors, turbine center frames, and high-tech manufacturing processes and repair techniques. This is the basis for continued systematic development of the present gas turbine-powered engines and for revolutionary new propulsion systems.

MTU’s main area of activity in the evolutionary development of gas turbine-powered engines is raising efficiency in order to minimize climate and health-related emissions. This will be achieved, on the one hand, by a further reduction in the fan pressure ratio, thereby increasing thrust efficiency. On the other hand, thermal efficiency will be increased by improving the efficiency of components and higher temperature and overall pressure ratios. Weight and dimensions also have a major influence on energy consumption. Here too, continuous improvement is the goal.

MTU’s mid- and long-term targets for the development of new commercial engines are aligned to the European Green Deal as an intermediate step towards achieving the overarching goal of the Paris Agreement. The MTU technology agenda Claire (Clean Air Engine) translates these into targets at the level of drive systems and serves as the guide for technology and innovation.

Stage 1 is the Geared Turbofan™ (GTF), which was developed in partnership with Pratt & Whitney and entered series production in early 2016 for the Airbus A320neo. The GTF reduces fuel consumption and hence CO_2 emissions by around 16% (see also “Commercial engine programs”). The recently presented improved product, the Pratt & Whitney GTF Advantage™, reduces CO_2 emissions even further.

Stage 2 of Claire aims to achieve a considerable improvement in the climate impact of aviation through revolutionary gas turbine-based concepts and electric propulsion systems based on fuel cells. One of the most promising gas turbine concepts is the water-enhanced turbofan engine, a system developed by MTU that considerably reduces all climate-related emissions. A second system being developed as part of Claire stage 2 is the flying fuel cell (FFC), a fully electric system based on a hydrogen fuel cell. This system is almost entirely emission-free and could be used in an initial product for smaller aircraft within the scheduled timeframe of 2035+.

Claire stage 3 concentrates on two areas: the use of the revolutionary concepts for the widest possible range of applications and optimization of energy consumption. Although these concepts are largely climate-neutral, minimizing energy consumption is vital to reduce pressure on resources and cut costs.

Technologies for engines of the future

Commercial engine programs

The most significant innovation in the area of aircraft engines in recent decades is the Geared Turbofan™ (GTF) engine developed by MTU in cooperation with Pratt & Whitney. Unlike conventional turbofans, in which the fan and low-pressure turbine run at the same speed on a single shaft, the GTF links the two components using a reduction gear. This allows the fan with its larger radius to rotate more slowly, while the low-pressure turbine rotates faster. Consequently, lower fan pressure ratios (high bypass ratios) are achieved, thereby improving thrust efficiency, increasing the efficiency of the fan and the low-pressure turbine, while cutting fuel consumption and carbon dioxide emissions by 16% each and reducing the noise level by 20 EPNdB, bringing it well below the requirement of certification. What is more, the engine is lighter because the low-pressure turbine and low-pressure compressor require fewer stages.

In the GTF project, MTU is responsible for developing and manufacturing the high-speed low-pressure turbine, the front half of the high-pressure compressor and four brush seals. In addition, MTU assembles 30% of serially produced engines for the Airbus A320neo and carries out acceptance tests for these engines. It is also a partner in the MRO network.

As of January 2023, the engines in the Geared Turbofan™ family had clocked up more than 18 million flight hours and avoided over 10 million metric tons of CO_2.

The next development stage of this product is already under way. From 2024, Pratt & Whitney and MTU will offer the Pratt & Whitney GTF Advantage™ for the A320neo, an even more efficient PW1100G-JM engine with higher thrust, which will increase range and loading capacity. The increased efficiency is attributable to improvements in the MTU components.

For the next generation of the Geared Turbofan™, the aim is to achieve a further increase in the lifecycle of components as well as a further reduction in fuel consumption. The reduction in fuel consumption should be achieved primarily by a further increase in the efficiency of the components, combined with higher overall pressure ratios. To achieve this, for example, highly complex 3D blade designs need to be implemented in a very small space. An increase in the lifecycle of components should be achieved, for example, through new coatings and optimized design concepts. Key technologies are therefore also required for production and assembly.

When it comes to engines of the highest thrust class for long-haul aircraft, MTU is participating in GE Aerospace's GE9X for the new Boeing 777X by developing and manufacturing the extremely demanding turbine center frame.

Military engine programs

The EJ200 engine powers the Eurofighter and is in service with numerous air forces. In 2022, MTU successfully continued the development of a new digital engine control & monitoring unit (DECMU) which it embarked on in 2021 to secure the future of this engine. As well as drawing up all necessary specifications, definition of the first hardware standards was completed. Procurement of the various hardware components is currently under way. Integration and start-up of the hardware and the start of the first validation round for flightworthy standard (FWS) are planned for 2023.

Germany, France and Spain are planning to introduce the new Future Combat Air System (FCAS) from 2040. A key component in this system is a new fighter jet, which is scheduled to come into service as from 2040. A central element in this new jet is the Next Generation Fighter Engine, for which MTU and Safran will be the joint lead for development, production and after-sales support. Two design phases involving MTU, Safran, ITP, Dassault and Airbus GmbH (Germany) / Airbus SAU (Spain) were successfully completed by the end of 2021. In the reporting period, agreements were signed between the customer and industry parties so the design studies can be continued from the start of 2023 and an intensive technology preparation stage can start.

New areas of business

The WET (water-enhanced turbofan) is a further development of the conventional gas turbine engine. It can reduce all climate-related emissions, thereby further reducing the overall climate impact. In connection with this technology, there was a positive decision on the SWITCH project application as part of the Clean Aviation initiative in 2022. From 2023, MTU will be developing technologies for the hybrid-electric water-enhanced turbofan with the industrial partners Pratt & Whitney, Airbus, Collins and GKN as well as academic partners.

Fuel cells powered by green hydrogen have the potential to enable emission-free flying in the longer term. Propulsion systems based on flying fuel cells (FFC) that are suitable for aircraft are not yet available. All known demonstration platforms are based on solutions from the automotive sector. Unlike aircraft applications, weight and parasitic load play a secondary role in the automotive sector.

Under the auspices of the German aviation research program, MTU is developing a propulsion system based on fuel cells for the aviation sector. An initial ground flight demonstrator is scheduled for 2024 and should take off in the middle of the decade in collaboration with the German Aerospace Center.

Digitalization

The trend toward digitalization and networked supply chains heralds the fourth industrial revolution, after the invention of the steam engine, the automated production line and the computer. People, machines, plants, logistics and products communicate and cooperate with each other, so that, for example, production is largely self-organizing. MTU is examining the entire product lifecycle and the entire value chain from development to manufacture and maintenance. The company's specific needs and requirements were defined by an interdisciplinary working group and translated into an overarching roadmap.
The roadmaps for individual units and topics derived from this define the specific areas of work, divided into time horizons of three, five and ten years. Establishing internal structures ensures efficient management and processing of the topics. One example is the Digi Board, a central body whose role is to select the right projects from a strategic viewpoint on the basis of a cross-functional definition of requirements.

Further technology projects have been launched through digitalization initiatives, leading ultimately to what is known as the "virtual engine."

One sub-aspect of this is the "digital twin," a purely digital reproduction of the actual components in a real engine. The main focus here is on networking data, interdisciplinary cooperation and automated design optimization. As well as speeding up the development phase by providing more robust predictions, these modules principally aim to reduce production and maintenance costs and increase the quality of components.

New design methods were developed, in particular, for revolutionary engine concepts, where conventional design methods can no longer be used. The highly interdisciplinary nature of these concepts requires a far more detailed overview of the interaction between the aircraft and engine because the key to leveraging their potential essentially lies in intelligent integration. To this end, MTU has acquired new insights and capabilities, especially in the field of system engineering.

Materials

Robust, high-temperature-resistant materials and the protective coatings required for them are key technologies that MTU is steadily driving forward for use in the next generation of the Geared Turbofan™.

For the planned development of the Next European Fighter Engine, there is a need for lightweight materials that can withstand high stress levels throughout operation. The future focus will be on fiber-reinforced composites and powder metallurgy materials.

On this basis, the aim is to launch projects with universities, research institutes and industrial partners in the future.

The revolutionary water-enhanced turbofan (WET) and flying fuel cell (FFC) concepts require greatly modified or completely new materials and coatings. For example, these have to be resistant to conditions where there is a high vapor content (in the case of WET) or to the use of hydrogen (in the case of FFC). MTU is already working on these topics in cooperation with universities and industrial partners.

Manufacturing and maintenance technologies

Additive manufacturing processes are opening the way to new methods of production. In this area, MTU is focusing on laser powder bed fusion, where the component is built up by fusing very thin layers of a powder material. MTU uses additive manufacturing to produce the borescope eyepieces for PW1100G-JM engines, making it one of the first companies to use this technique for series production of aviation components. Preparations are under way to introduce this type of process to manufacture complex components such as bearing housings. The longer-term plan is to create new designs that would be either impossible or very costly to implement using traditional technology.

Further automation of additive manufacturing is needed to reduce costs and throughput times. Important steps for this were explored with 14 institutes and industrial partners in the IDEA (Industrialization of Digital Engineering and Additive Manufacturing) project, which was completed in 2022. The focus was on a holistic view of the entire process chain, including coupling hardware and software, using digital twins, and through end-to-end data formats, process simulation and process control systems. The project was supported by the German Federal Ministry of Education and Research and was successfully completed with the manufacture of demonstration components on two pilot lines.

In recent years, MTU has carved out a leading position as a manufacturer of blisk rotors for compressors. (Blisks are blade integrated disks, i.e., they combine the blade and disk in a single component). For these blisks, which are made of nickel-based alloys, which are extremely difficult to process and are used in the aft stages of high-pressure compressors, MTU has developed a new electrochemical material-removal process (Precise Electrochemical Machining – PECM). By working with an extremely small inter-electrode gap, in the micrometer range, PECM accomplishes much greater reproduction precision. There are also plans to use this technology in fields with very complex geometries. This applies, above all, to future high-pressure compressors, which have increasingly small dimensions as the overall pressure ratios are constantly increasing. Innovative technologies for the cathode design, novel generators and more efficient and more environmentally friendly electrolyte preparation are to be used.

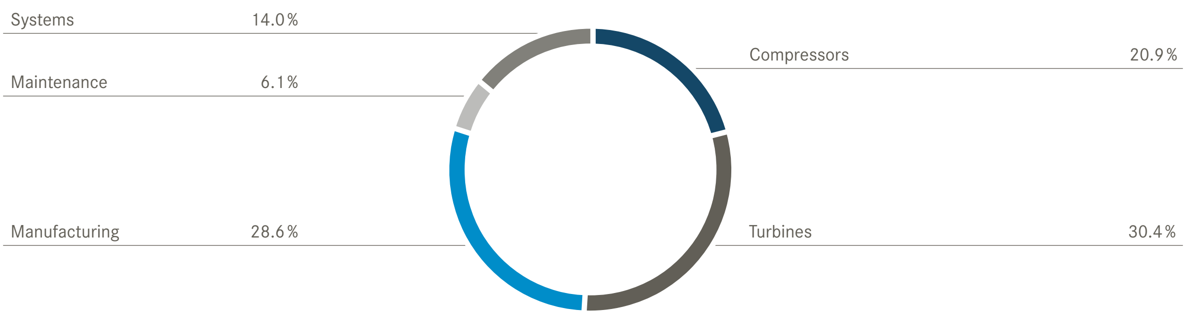
So far, profile grooves for turbine disks have been produced by broaching. Since turbine disks are also made of materials with high heat resistance that are time-consuming to process and cause heavy wear, MTU aims to transfer PECM technology from compressor blisks to turbine disks. In the reporting year, the technology was brought to maturity. A production line is currently being installed in a dedicated production building. In parallel, proof of readiness for series production is being established. Series production of GTF turbine blisks using PECM technology is scheduled to start in the first quarter of 2024 and should greatly enhance the profitability of the GTF program.

In commercial maintenance, further engine trend monitoring modules were introduced. Online diagnosis of the aging of engine modules such as high-pressure compressors and low-pressure turbines is now possible, allowing more efficient management of the scope and timing of maintenance.

Protecting technology assets (intellectual property)

As of the end of the year, MTU's patent portfolio contained 786 patent families (2,675 individual patents). A patent family is a set of identical patents registered in various countries. As of the reporting date, this portfolio covered the following fields of technology:

[T21] Breakdown of MTU's patent portfolio by field of technology



Cooperation in science and research

For decades, cooperation with universities and research institutes has been a fixed element of research and development work at MTU. For instance, specimen engines are made available to universities and colleges, MTU experts give lectures or supervise students writing internship reports, theses and dissertations. Furthermore, students are given support with assignments and final reports. In addition, MTU honors outstanding achievements by awarding the annual Heilmann prize to a young scientist meriting recognition for achievements in engine technology.

Strategic alliances are established with research partners in order to strengthen ties between universities and industry, and to safeguard MTU's innovative capabilities. Cooperation with leading German universities and research institutes was stepped up during the past years. In specific areas of research, cooperation with MTU competence centers is continuously being extended.

To complement MTU's technological focus, the company is supporting the construction of production facilities for sustainable aviation fuel.

Based in Munich, Bauhaus Luftfahrt is a visionary think tank with an international dimension that pursues unconventional, holistic and interdisciplinary research. It brings industry and science together under one roof, focusing primarily on exploring the socioeconomic, political and ecological aspects of aviation, designing visionary aircraft and engine systems, unearthing promising technologies for the future and carrying out knowledge management.

As well as supporting projects on revolutionary propulsion systems, in the reporting period a project on the use of hydrogen and SAF in aviation was completed.

Investment in research and development

[T22] Research and development

in € million	2022	2021	Change against previous year in € million	Change against previous year in %
Commercial engine business (OEM)	216	173	43	24.8
Military engine business (OEM)	35	40	-6	-13.8
Commercial maintenance business (MRO)	15	17	-2	-11.5
Total research and development expenses	**265**	**230**	**35**	**15.4**
Refund of research and development expenses	-65	-70	5	7.4
Research and development expenses - own contribution	**201**	**160**	**41**	**25.3**
Expenditure meeting recognition criteria for intangible assets				
commercial and military engine business (OEM)	-66	-49	-17	-34.4
commercial maintenance business (MRO)		-1	1	100.0
Amortization of previously capitalized development costs	93	70	24	34.5
Research and development expenses - effect on profit or loss	**228**	**180**	**48**	**26.8**
thereof: in gross profit	123	97	26	26.8
thereof: in functional costs - research and development	106	83	22	26.8

Research and development expenses amounted to 5.0% of revenue, slightly below the prior-year level of 5.5%.

Refund of research and development expenses principally comprises public grants for research and development for quieter and more fuel-efficient aircraft engines.

The Group funds its share of the research and development expenses. If the criteria for capitalization are met, the development expenses are recognized as internally generated intangible assets or as other assets if consideration is paid (acquired development work), and subsequently amortized through revenue or the cost of goods sold. Information on capitalized expenses for internally generated intangible assets can be found in *Note 13 "Intangible assets"* in the notes to the consolidated financial statements. Further information on acquired development work can be found in *Note 17 "Acquired program assets, development work, and other assets"* in the notes to the consolidated financial statements.

Investment in intangible assets in the OEM segment (commercial and military engine business) which meets the capitalization criteria relates principally to the engine programs in the Pratt & Whitney GTF™ family of engines, the GE9X and the PW800 program.

The development of amortization of capitalized development costs in the reporting period was again attributable to impairment losses on internally generated intangible assets and acquired development work in connection with the PW1400G engine program for the Russian Irkut MC-21 and the T408 engine program for the Sikorsky CH-53K heavy duty cargo helicopter (previous year: the PW1700G engine program for the Embraer E175-E2). Further information on the special items in the impairment losses can be found in *Note 12 "Additional disclosures relating to the income statement."*

Economic report

Macroeconomic conditions

Russia's invasion of Ukraine, high inflation and the repercussions of the Covid-19 pandemic put pressure on the global economy in 2022. In October, the IMF predicted that global growth would be 2.9% in 2022. Before the war, it had forecast growth of 4.2%.

In some major economies, especially the USA and Europe, initial interest rates were made to check rising inflation. This resulted in the appreciation of the U.S. dollar, further increasing the inflationary and debt pressure on emerging markets and developing economies.

In the world's three most important economies, economic momentum declined. Gross domestic product (GDP) grew by 3.1% in the euro zone in 2022. Rising energy prices were the main problem in this region. In the USA; GDP rose 1.6% year-on-year. Although the labor market was strong, the U.S. economy gradually lost momentum as a consequence of the Fed's strict interest rate policy. In China, the pandemic continued disrupt supply chains and the growth rate dropped to 3.2% as a result of lockdowns and the weakness of the real estate sector.

Sector-specific conditions within the aviation industry

The aviation industry continued to recover from the Covid-19 pandemic in 2022. According to IATA, global passenger traffic picked up strongly in 2022, rising to 71% of the pre-crisis level of 2019, compared with 42% in the previous year (source: IATA). The fastest recovery was in North America.

From the end of February, however, the general market upturn was dampened by the Ukraine conflict. In particular, indirect effects such as the rising price of oil and the related inflation rates proved challenging for the sector. Moreover, as a result of China's prolonged zero-Covid policy, this high-volume passenger market was largely excluded from the global uptrend.

The picture was similar for the number of passenger flights, which is the most significant factor affecting demand for maintenance and spare parts. Here, aircraft movements rose by 26%. The number of passenger flights in single-aisle aircraft increased by 27% in 2022, while twin-aisle aircraft registered an increase of 23% (source: Flightradar 24).

Having risen to above the 2019 level in 2021, the volume of air cargo dropped by 8.0% in 2022 and is now 1.6% below the pre-crisis level. The main reasons for this trend were supply chain disruption, China's zero-Covid policy until the beginning of December and the signs of a global slowdown. Nevertheless, flight movements by cargo-only aircraft remained almost unchanged at 32% above the pre-crisis level of 2019. MTU benefited disproportionately from this positive trend compared with the sector average because about 15% of the engine fleet of relevance to the Group operates in the cargo segment. Industry-wide, cargo aircraft account for 10% of the active global fleet (source: Cirium Fleets Analyzer).

Compared with 2021, which was dominated by the crisis, airlines' revenue increased by 43.6% from U.S.$506 billion to U.S.$727 billion according to IATA. In total, the airlines reported a net loss of U.S.$6.9 billion in 2022. In the previous year, the loss was U.S.$42 billion.

The average oil price was U.S.$103 per barrel Brent crude in 2022, compared with U.S.$70 in 2021 (source: IATA). The increase in the oil price was negative for the sector, although it dropped back towards year-end due to high inventories and the loss of momentum in the global economy.

In parallel with the market recovery, more aircraft were ordered and taken into service in 2022. As of end-December 2022, Boeing and Airbus had 11,817 orders on their books. That was nearly 500 more than a year earlier (source: Airbus, Boeing). Although 2022 was overshadowed by capacity bottlenecks, taken together, Airbus and Boeing delivered 1,141 aircraft, an increase of 20% (source: Cirium Fleets Analyzer). Boeing benefited from the lifting of the flight ban on the 737 Max and restarted production of the 787 in August. Airbus increased deliveries of the A320 range of mid-haul jets from 483 in 2021 to 515 in 2022 (source: Cirium).

Overall assessment of the business environment

Following the improvement in economic conditions in 2021, the global economy suffered a renewed setback in 2022. Russia's invasion of Ukraine, high inflation and the ongoing effects of the Covid-19 pandemic had a strongly downside effect. In October, the IMF projected that global growth would be 2.9% in 2022, well below the level of 4.2% forecast before the war.

Passenger traffic improved: In 2022 it was 71% of the pre-crisis level, compared with 42% in 2021 (source: IATA). In view of this significant recovery, the airlines' net loss dropped from U.S.$42 billion to U.S.$6.9 billion (source: IATA). Aircraft manufacturers Airbus and Boeing delivered a total of 1,142 aircraft, an increase of 20%, despite bottlenecks in production capacity throughout the year. By end-December 2022, their combined order backlog had risen to a total of 11,817 aircraft, compared with 11,332 at end-December 2021.

Financial situation

The following explanatory comments and analyses are based on the audited MTU consolidated financial statements for the fiscal years ending December 31, 2022 and 2021. The consolidated financial statements were drawn up in accordance with the International Financial Reporting Standards (IFRSs) issued by the International Accounting Standards Board (IASB), to the extent that these have been adopted by the European Union.

In accordance with IFRS requirements, new and revised standards and interpretations were applied for the first time in the financial statements for 2022. This did not have a material impact on the net assets, financial position and results of operations of the Group, which are described in detail in the Notes to the consolidated financial statements under *"Accounting standards, interpretations, and amended standards and interpretations applied for the first time in fiscal year 2022."*

The exchange rates used for translating the MTU Group's key foreign currencies into euros are the following official rates set by the European Central Bank:

[T23] Foreign currency exchange rates

Currency	ISO code	Rate at reporting date		Average rate	
		Dec. 31, 2022 € 1 =	Dec. 31, 2021 € 1 =	**2022 € 1 =**	2021 € 1 =
U.S. dollar	USD	1.0666	1.1326	1.0530	1.1827
Canadian dollar	CAD	1.4440	1.4393	1.3695	1.4826
Chinese renminbi	CNY	7.3582	7.1947	7.0788	7.6282
Polish zloty	PLN	4.6808	4.5969	4.6861	4.5652
Serbian dinar	RSD	117.3224	117.5821	117.4588	117.5733

Results of operations

Group

[T24] Consolidated income statement

in € million	2022	2021	Change against previous year in € million	in %
Revenue	**5,330**	**4,188**	**1,143**	**27.3**
Cost of goods sold	-4,475	-3,601	-874	-24.3
Gross profit	**855**	**586**	**269**	**45.9**
Function costs	-347	-232	-116	-49.9
Earnings before interest and taxes (EBIT)	**508**	**355**	**153**	**43.2**
Net financial income/expense	-45	-39	-6	-15.7
Earnings before income taxes	**463**	**315**	**147**	**46.6**
Income taxes	-130	-84	-46	-53.9
Net income	**333**	**231**	**102**	**44.0**
Basic earnings per share (in €)	6.21	4.17	2.04	48.8
Diluted earnings per share (in €)	6.06	4.09	1.98	48.3
Earnings before interest and taxes, depreciation and amortization (EBITDA)	**865**	**712**	**154**	**21.6**

Revenue

The increase in revenue is mainly attributable to the development of the commercial maintenance business (MRO). Here, revenue (before consolidation) rose by €875 million from €2,741 million in the previous year to €3,616 million, driven principally by additional maintenance work for the V2500, CF34 and PW1100G-JM engine types and the recovery of the engine leasing business. Overall, revenue benefited from the stronger average U.S. dollar exchange rate compared with the previous year.

The commercial and military engine business (OEM) also posted a rise in revenue (before consolidation) to €1,831 million, an increase of €284 million from the previous year's level of €1,547 million. This increase was principally due to the positive development of both the new engines and the spare parts business for the GTF programs as well as growth in the aftermarket business with the IAE/V2500, PW2000, GE/GEnx and CF6-80 engines. The development of revenue was also affected by the invoicing-related addition/utilization of refund liabilities for invoice corrections in connection with risk-and-revenue-sharing consortia, which impacted the revenue from/expenses for stakes in commercial engine programs (OEM). Considering the fact that billing in U.S. dollars is customary in the aviation sector, revenue development was further boosted by the development of the U.S. dollar exchange rate, which averaged U.S.$/€ 1.05 in 2022 compared with U.S.$/€ 1.18 in the previous year. In contrast, the measurement of refund liabilities within the scope of stakes in commercial engine programs on the basis of the closing rate had a negative effect considering the change in the exchange rate prevailing at the closing date from U.S.$/€1.13 on December 31, 2021, to U.S.$/€1.07 at this closing date.

Further, impairment losses in connection with the change in compensation payments on development assets reduced revenue by €10 million (previous year: impairment losses reduced revenue by €7 million). In the reporting period, these impairment losses comprised €6 million on the stake in the T408 engine program and €4 million in connection with the war in Ukraine. The impairment losses in connection with the war in Ukraine relate to the termination of relationships with Russian business partners in both the OEM and the MRO business.

Cost of goods sold and gross profit

The cost of goods sold increased as a result of the higher volume of business but not as fast as the rise in revenue. While the U.S. dollar exchange rate trend and inflation effects caused prices to increase, economies of scale realized in relation to the utilization of production and service capacities had the opposite effect compared to the previous year.

Impairment losses amounting to €77 million (previous year: €76 million on assets for the PW1700G and GE/F414 program) were still included in the cost of goods sold. The principal reasons for impairment losses in the reporting periods were asset impairments of €59 million (previous year: €0 million) in connection with the war in Ukraine and the reduction in forecast sales of the T408 program (the engine for the Sikorsky CH-53K cargo helicopter), mainly because of a decision by the German armed forces in favor of an alternative product.

All in all, compared to the previous year, gross profit was higher, and the gross margin, which is defined as the ratio of revenue less cost of goods sold to revenue, improved from 14.0% in the previous year to 16.0% in the reporting period.

Reconciliation to adjusted key performance figures

The reconciliation serves to factor special items out of the key earnings figures of the Group and its business segments. In this way, the success of managing operating activities is measured. The adjusted earnings figures also support comparability over time, and between MTU and other companies.

MTU utilizes the following adjusted key performance figures in its financial reports: adjusted earnings before interest and taxes (adjusted EBIT), the adjusted EBIT margin and adjusted net income. The earnings figures do not come under the provisions of the International Financial Reporting Standards (IFRSs); they are to be seen as an addition to the key financial indicators reported pursuant to IFRS.

In the interests of ensuring comparability of the EBIT figure, it is regularly adjusted for the following special items: Firstly, the contributions resulting from the recurring "effects from purchase price allocation," the "effects from the increase in the stake in IAE-V2500" and extraordinary effects such as, in the reporting period, the considerable effects attributable to "impairment losses," "restructuring expenses" and "changes in the consolidated group."

"Effects of the purchase price allocation": As of January 1, 2004, MTU passed into the ownership of Kohlberg Kravis Roberts & Co. Ltd. (KKR), following the latter's purchase of 100% of the MTU shares from the then DaimlerChrysler AG. In the context of the acquisition, assets, liabilities and contingent liabilities were identified in accordance with IFRS 3 and measured at fair value. Since then, the identified intangible assets, in particular, have resulted in substantial amortization. The resulting earnings impacts are eliminated as special items in the reconciliation to adjusted EBIT.

"Effects from the increase in the stake in IAE-V2500": The increase in MTU's stake in the Pratt & Whitney IAE-V2500 program in 2012 was accounted for as the addition of a program asset. Since then, this asset has been amortized over the expected remaining useful life of the program, thereby reducing revenue, and the corresponding earnings impact is eliminated as a special item in the reconciliation to adjusted EBIT.

"Impairment losses": Significant earnings impacts resulting from asset impairment losses, especially in accordance with IAS 36, are eliminated as special items in the reconciliation to adjusted EBIT. In the reporting period, such special items were recognized in connection with the termination of business relationships with Russian partners as a consequence of the war in Ukraine. This affected the stake in the PW1400G-JM program and, to a smaller extent, assets related to commercial aftermarket business and the PW1100G-JM. The associated earnings impacts are eliminated as special items in the reconciliation to adjusted EBIT.

In the reporting period, MTU made or agreed to make compensatory payments totaling U.S.$20 million to lessors for a total of four leased engines seized by Russian business partners. MTU has relevant insurance coverage in the form of a contingent hull war insurance policy for these events. As of the date that these financial statements were prepared, the insurance has provided material confirmation of the coverage, however it has made its commitment subject to completion of an audit under sanction law, as is customary. In consideration of its legal advisors, MTU management assesses the risk that the claim to compensation will be rejected as a result of the conditional audit under sanction law as very low. Nonetheless, the claim at issue – taking into account the extremely high accounting thresholds for recognizing insurance claims – will be classified as a contingent receivable and has not been capitalized as of the closing date. The effect on earnings from the election not to capitalize the expected insurance compensation payment is offset as a special item "Russia-Ukraine war" in the calculation of adjusted EBIT and the adjusted net income. The event will be handled analogously in the following year upon receipt of the insurance compensation payment and correspondingly the contribution from this transaction will be adjusted as a special item.

This category also had to take account of impairment losses as a consequence of the expected impact on sales of the GE T408 program – the engine for the Sikorsky CH53-K cargo helicopter; the associated earnings contributions are eliminated as a special effect in the reconciliation to adjusted EBIT. In the previous year, this category contained, in particular, the impairment loss on the stake in the PW1700G and GE/F414 programs.

"Restructuring expenses": Significant earnings impacts due to restructuring measures within the meaning of IAS 37. No such effects had to be recognized in the reporting period or the previous year.

"Changes in the consolidated group": Considerable earnings impacts result from the acquisition, divestment or discontinuation of material investments and processes of a comparable nature. In the previous year, this category contained the deconsolidation gain from the sale of Vericor Power Systems LLC. The corresponding earnings impacts were eliminated as a special item in the reconciliation to adjusted EBIT.

Similarly, the effect of the special items outlined above is eliminated from earnings before income taxes. To establish adjusted earnings before income taxes, net interest income/expense and the interest shares in other financial income/expense connected with provisions for pensions and liabilities from pensions and plan assets are added to adjusted EBIT. None of the other components of financial income/expense that are influenced by the U.S. dollar exchange rate, such as the effects of exchange-rate hedging, were taken into account.

The adjusted earnings before income taxes is used to determine the adjusted net income. The normalized income taxes are calculated on the basis of the expected average tax rate for the Group of 26%. The profit/loss of companies accounted for using the equity method does not form part of the tax base.

[T25] Reconciliation of the consolidated income statement

	2022			2021		
in € million	As reported	Non-recurring items	After adjustment	As reported	Non-recurring items	After adjustment
Revenue	**5,330**		**5,330**	**4,188**		**4,188**
Cost of goods sold	-4,475		-4,475	-3,601		-3,601
thereof: special item effects of purchase price allocation		20	20		21	21
thereof: special item effects from increase in the stake in IAE/V2500		23	23		23	23
thereof: special item impairment losses		24	24		83	83
thereof: special item impairment losses (Russia/Ukraine war)		63	63			
Gross profit	**855**	**129**	**984**	**586**	**127**	**713**
Research and development expenses	-106		-106	-83		-83
Selling expenses	-143		-143	-124	0	-124
thereof: special item impairment losses (Russia/Ukraine war)		12	12			
General administrative expenses	-111		-111	-92		-92
Other operating income and expenses	-50		-50	-16		-16
thereof: change of consolidation scope					-13	-13
Profit/loss of companies accounted for using the equity method	60		60	81		81
thereof: special item impairment losses (Russia/Ukraine war)		6	6			
Profit/loss of equity investments	3		3	2		2
Earnings before interest and taxes (EBIT)	**508**	**147**	**655**	**355**	**114**	**468**
Net interest income/expense	-22		-22	-29		-29
Other financial income – interest included in the measurement of pensions	-11		-11	-6		-6
Other financial income/expense – miscellaneous (e.g. measurement of foreign currency holdings)	-12	12		-4	4	
Earnings before income taxes	**463**	**159**	**622**	**315**	**118**	**433**
Income taxes	-130		-130	-84		-84
Adjustment based on normalized income taxes		-16	-16		-7	-7
Net income	**333**	**143**	**476**	**231**	**111**	**342**

Earnings before interest and taxes (EBIT)

The development of EBIT compared with the previous year corresponds, in particular, with the development of the gross profit. This positive earnings effect was reduced to some extent by a business-related drop in the profit/loss of companies accounted for using the equity method and by higher other function costs. These were attributable to credit default risks due to the Russia/Ukraine war and the year-on-year impact of inflation. In addition, other operating income and expenses deteriorated. The main factors in this were the development of the risk of expenses for legal action and lawsuits and the non-recurring deconsolidation gain from Vericor Power Systems LLC recognized in the previous year.

Overall, there was a year-on-year improvement in both earnings before interest and taxes (EBIT) and adjusted earnings before interest and taxes (adjusted EBIT). This corresponds to an adjusted EBIT margin of 12.3% (previous year: 11.2%).

Net financial income/expense

This item deteriorated in the reporting period, mainly as a result of foreign currency measurement effects and higher interest expense for pension provisions due to the change in the discount rate.

Earnings before taxes (EBT)

The positive development of EBT in the reporting period compared with the previous year corresponds to the positive development of EBIT and the slightly negative development of net financial income/expense.

Income taxes

Income tax expense amounted to €130 million in the fiscal year 2021 (previous year: €84 million). The effective Group tax rate, calculated on the basis of earnings before taxes, was 28.1% (previous year: 26.7%). Information on the reconciliation of the expected tax expense to the effective tax expense is provided in *Note 10 "Income taxes"* in the Notes to the consolidated financial statements.

Net income

Net income increased by €102 million (44.0%) to €333 million (previous year: €231 million) and, correspondingly, adjusted net income increased by €134 million (39.2%) to €476 million (previous year: €342 million).

Consolidated statement of comprehensive income

In the consolidated statement of comprehensive income, net income is reconciled with the total comprehensive income for the period of €466 million (previous year: €207 million).

The income and expense items directly recognized in other comprehensive income in the reporting period, net of deferred taxes, mainly comprised actuarial gains on pensions obligations and plan assets totaling €151 million (previous year: €26 million) and exchange rate gains in the translation of foreign businesses amounting to €16 million (previous year: €62 million), which were offset by the drop of €34 million (previous year: €106 million) in the fair value of hedging instruments.

Earnings per share

Basic earnings per share amounted to €6.21 (previous year: €4.17). Taking into account the potential issue of shares resulting from convertible bonds, diluted earnings per share came to €6.06 (previous year: €4.09).

Net profit available for distribution

For an explanation of how the net profit available for distribution is determined, please refer to the Notes to the consolidated financial statements in *Section VII. "Determination of the net profit available for distribution on the basis of the annual financial statements."*

Order backlog

MTU's order backlog consists of firm customer orders that commit the Group to delivering products or providing services, plus the contractual value of service agreements. As of December 31, 2022, the order backlog (after consolidation) amounted to €22.3 billion (previous year: €22.2 billion). Compared with the previous year, the order backlog increased in the OEM segment and declined in the MRO segment.

OEM segment

Revenue

The commercial and military engine business (OEM) also posted a rise in revenue (before consolidation) to €1,831 million, an increase of €284 million from the previous year's level of €1,547 million. This increase was principally due to the positive development of both the new engines and the spare parts business for the GTF programs as well as growth in the aftermarket business with the IAE/V2500, PW2000, GE/GEnx and CF6-80 engines. Revenue development was also influenced by accruals for outstanding invoice corrections relating to participation in the revenues and expenses of commercial engine programs

(OEM) through risk-and-revenue-sharing stakes in consortia, including the additional costs and credit default risks relating to aftermarket contracts with program customers. Considering the fact that billing in U.S. dollars is customary in the aviation sector, revenue development was further boosted by the development of the U.S. dollar exchange rate, which averaged U.S.$/€ 1.05 in 2022 compared with U.S.$/€ 1.18 in the previous year. In contrast, the measurement of refund liabilities within the scope of stakes in commercial engine programs on the basis of the closing rate had a negative effect considering the change in the exchange rate prevailing at the closing date from U.S.$/€1.13 on December 31, 2021, to U.S.$/€1.07 at this closing date.

Revenue in the commercial engine business increased by €269 million (25.2%) to €1,335 million. The highest revenue generators in the reporting period were the PW1100G-JM for the A320neo and the V2500 engine for the classic A320 family.

Revenue in the military engine business was €496 million, an increase of €15 million (3.1%) from the previous year's level of €482 million. Here, the main sources of revenue in the reporting period were the EJ200 engine for the Eurofighter and the RB199 for the Panavia Tornado.

[T26] Revenue and adjusted EBIT (OEM)

in € million	2022	2021	Change against previous year in € million	Change against previous year in %
Revenue	**1,831**	**1,547**	**284**	**18.3**
Cost of goods sold	-1,331	-1,197	-134	-11.2
Gross profit	**500**	**351**	**149**	**42.6**
Gross margin (in %)	27.3	22.7		
Adjusted EBIT	**387**	**320**	**67**	**20.9**
Adjusted EBIT margin (in %)	21.1	20.7		

Adjusted earnings before interest and taxes (adjusted EBIT)

Adjusted EBIT benefited from higher demand in the commercial spare parts and series business and especially from the realized product mix and the related improvement in margins. Revenue rose and earnings from the PW1100G-JM program increased significantly. There was also a significant increase in the earnings from the PW2000, GE/CF6-80 and IAE/V2500 programs. The strong average U.S. dollar exchange rate in the period under review also supported adjusted EBIT as revenue was higher in euros. A negative effect came from the U.S. dollar exchange rate at year-end, especially its impact on the refund liabilities in connection with invoice corrections relating to stakes in consortia for commercial engine programs. Overall, adjusted EBIT was higher than in the previous year. EBIT did not rise quite as fast as adjusted EBIT in the reporting period: it increased to €268 million compared with €209 million in the previous year. EBIT was additionally affected by impairment losses of €53 million (previous year: €0 million) in connection with the war in Ukraine as well as further impairment losses of €24 million on the stake in the T408 engine program (previous year: €83 million on the stakes in the PW1700G and F414 programs). In 2021, a deconsolidation gain of €13 million from the sale of Vericor Power Systems was recognized. Information on adjusted earnings is provided under *Reconciliation to adjusted key performance figures in the "Results of operations"* section.

Capital expenditure

Capital expenditure on intangible assets came to €58 million (previous year: €54 million) and essentially related to the capitalization of self-generated development work for the Pratt & Whitney GTF™ engine family, the GE9X and the PW800 engine program. Capital expenditure on property, plant and equipment amounted to €157 million (previous year: €148 million) and related principally to construction in progress to expand production capacity and to other equipment, operational and office equipment. Expenditure on program assets and acquired development work was €26 million (previous year: €18 million) and mainly related to the stake in the PW800 engine program and the Pratt & Whitney GTF™ engine family. Information about investments in financial assets is provided under *"Financial position."*

Employees

The average number of employees in the OEM segment increased by 402 to 6,751 (previous year: 6,349).

MRO segment

Revenue

In the commercial maintenance business, revenue (before consolidation) increased by €875 million year-on-year to €3,616 million (previous year: €2,741 million). There was an increase in both revenue from the MRO segment's core business that is not tied to OEMs and revenue from orders placed by OEMs for the PW1100G-JM program. The ratio was roughly 70% to 30%. The most important sources of revenue in the core MRO business were the V2500 engine type for the classic A320 family and the CF34 engine program. In addition to the growth in the engine leasing business, the MRO segment benefited from the development of the long-term maintenance business. Revenue also benefited from the stronger U.S. dollar exchange rate than in the previous year.

[T27] Revenue and adjusted EBIT (MRO)

in € million	2022	2021	Change against previous year in € million	Change against previous year in %
Revenue	**3,616**	**2,741**	**875**	**31.9**
Cost of goods sold	-3,259	-2,504	-755	-30.2
Gross profit	**357**	**237**	**120**	**50.7**
Gross margin (in %)	9.9	8.6		
Adjusted EBIT	**268**	**149**	**119**	**80.4**
Adjusted EBIT margin (in %)	7.4	5.4		

Adjusted earnings before interest and taxes (adjusted EBIT)

The cost of goods sold did not rise as fast as revenue due to the product mix and economies of scale. Consequently, the gross margin improved from 8.6% in the previous year to 9.9% in the reporting period. There was a corresponding improvement in EBIT to €239 million, compared with €146 million in the previous year. There was a slightly stronger rise in adjusted EBIT and the adjusted EBIT margin due to the adjustment for the special item "impairment losses (Russia/Ukraine war)" in the reporting period. Information on adjusted earnings is provided under Reconciliation to adjusted key performance figures in the *"Results of operations"* section.

Capital expenditure

Capital expenditure on intangible assets and property, plant and equipment increased by €50 million to €232 million (previous year: €183 million). This was mainly attributable to MTU's investment in the growing engine leasing business. In addition, MTU continued to invest building up the new MTU Maintenance Serbia repair facility, expansion of MTU Maintenance Hannover, and in further capacity-related expansion and replacement measures. Information about investments in financial assets is provided under *"Financial position."*

Employees

The average number of employees in the MRO segment increased by 239 to 4,198 (previous year: 3,959).

Financial position

In the reporting period, the revolving credit facility concluded with five banks, which would have run until October 28, 2023, was replaced ahead of schedule by a new €500 million revolving credit facility with nine banks. This credit facility has a term of five years, ending on June 29, 2027, and can be extended twice by one year in each case at the company's request.

Principles and objectives of financial management

The main objectives of financial management are efficiently ensuring that the Group has adequate liquidity or financing to avoid financial risks and safeguard financial flexibility. The Treasury department issues policies for managing interest rate, currency management and counterparty risks, financing, investing surplus liquidity and selecting suitable banks centrally for the Group.

As a rule, the cash flow from operating activities in the business segments represents the Group's main source of liquidity. Liquidity forecasts are based on the Group's operational and strategic planning, flanked by a monthly rolling (short-term) liquidity forecast. Except where there are conflicting regulatory or tax requirements, the Group is financed centrally via MTU Aero Engines AG. A central cash pooling system is in place for the Group companies in Germany. This provides the necessary funding for the subsidiaries. Moreover, the subsidiaries invest their surplus liquidity with MTU Aero Engines AG. This reduces the need for external borrowing and thus cash outflows for interest payments.

The limits set for counterparties are based on their long-term credit rating, their historical probability of default derived from this, and the size of the company. The limits set also support risk-based diversification of the credit default risk in connection with the investment of funds and the use of derivatives. The minimum requirement for treasury counterparties is an investment-grade rating. Funds are invested primarily in euro-denominated sight and time deposits, money market funds and commercial paper. Foreign currency investments are only permitted up to the level of the surplus liquidity in the respective currency; speculative investment to improve the interest yield is not permitted. The term of investments is determined by liquidity planning. Apart from unavoidable negative interest rates in certain currencies, the investment policy is geared to preserving value and the liquidity of the investments. The risk of devaluation of the amounts invested is negligible due to the very short nature of such investments.

MTU's financing strategy basically aims to ensure an appropriate financial structure in order to maintain the investment-grade credit rating.

To achieve this target, MTU uses a variety of internal and external financing instruments, including occupational pension plans, bonds, credit facilities and leasing models. For information on the Group's capacity to raise funds through authorized and contingent capital, please refer to Note 24 "Equity" in the Notes to the consolidated financial statements.

The Risk report and Note 35 "Financial risk" in the Notes to the consolidated financial statements provide information on MTU's approach to the financial risks inherent in financing and measurement, the methods used to hedge interest rate and currency risks, and price, default and liquidity risks.

Financing instruments

[T28] Material external financing sources

Type of financing	Maturity date	Currency	Interest rate
Registered bond	June 12, 2028	€	Fixed interest rate
Corporate bond	July 1, 2025	€	Fixed interest rate
Convertible bond 2016	May 17, 2023	€	Fixed interest rate
Convertible bond 2019	March 18, 2027	€	Fixed interest rate
Revolving credit facility	June 29, 2027	€	Euribor rate + margin
Lease liabilities	Various	€	Fixed interest rate

The revolving credit facility, which has not been fully drawn down, is available in full until the due date and gives MTU additional financial headroom.

The factors considered when choosing financing instruments are flexibility, credit terms, the profile of maturity dates, diversification of the investor base and borrowing costs. Material sources of financing include standard market covenants requiring the Group to ensure that its performance indicators remain within defined limits. MTU complied with the contractual obligations arising from such covenants as of December 31, 2022, and as of the end of every quarter of the reporting year. Further information on financing instruments is provided in Note 28 "Financial liabilities" in the Notes to the consolidated financial statements. Material agreements in relation to a change of control subsequent to a takeover bid are set out in the section titled "Disclosures under takeover law."

As in previous years, MTU did not engage in any off-balance-sheet financing transactions in the reporting period, such as the sale of receivables in connection with asset-backed securities or obligations toward special-purpose entities.

Net financial debt

Net financial debt serves as an indicator of the MTU Group's financial situation and is defined as the difference between gross financial debt and current financial assets. Net financial debt was higher than on December 31, 2021. This mainly resulted from the agreement of financing for accumulated refund liabilities in connection with the stake in the Pratt & Whitney PW1100G-JM program. In the fiscal year, an agreement was concluded with the OEM Pratt & Whitney to repay the cumulative production-related compensation payments within the scope of MTU's membership in the consortium for the PW1100G-JM engine program by the end of 2021. In previous periods, the abovementioned compensation payment obligation was to be accounted for as a component of current refund liabilities, taking account of the estimations regarding amount and maturity. More details are provided in Note 28 "Financial liabilities" in the Notes to the consolidated financial statements.

[T29] Net financial debt

in € million	Dec. 31, 2022	Dec. 31, 2021	Change against previous year in € million	in %
Bonds and notes	605	604	1	0.2
Convertible bonds	531	529	2	0.3
Lease liabilities	166	176	-10	-5.9
Other financing liabilities (Financing component)	333	142	191	>100
thereof: arising from new stakes in engine programs	114	142	-27	-19.3
thereof: from compensation payments due to program participations	219		219	
Gross financial debt	**1,635**	**1,451**	**184**	**12.7**
less:				
cash and cash equivalents	823	722	101	14.0
Loans to third parties	60	56	3	5.6
Financial assets	**882**	**778**	**105**	**13.4**
Net financial debt	**753**	**673**	**80**	**11.8**

Bonds and notes

Registered bond

MTU Aero Engines AG issued a registered bond on June 12, 2013, for a total nominal amount of €100 million. The registered bond matures on June 12, 2028, and is subject to interest of 3.55% p.a., payable in arrears on June 12 of each year, for the first time on June 12, 2014. The registered bond, net of transaction costs and including a discount of €3 million, is measured at amortized cost.

Corporate bond

On July 1, 2020, MTU Aero Engines AG issued an unsecured corporate bond with a nominal value of €500 million. The bond has a maturity of five years until July 1, 2025, and is available in units of €1,000. The coupon is 3.0% p.a., payable annually in arrears. The bond is listed on the regulated market on the Luxembourg Stock Exchange.

Convertible bonds

In 2016, MTU Aero Engines AG issued a senior unsecured convertible bond for a total nominal amount of €500 million. This bond is convertible into new and/or existing registered non-par-value shares in MTU. The convertible bond has an original maturity of 7 years and is divided into units of €100,000. It bears a nominal interest rate of 0.125% p.a., payable annually in arrears. Bondholders have been entitled to convert their convertible bonds into common shares of MTU Aero Engines AG at any time since June 27, 2016. The initial conversion price was set at €124.7701, which represents a premium of 50% above the reference rate at the bond issue date.

Under the terms of issue of the convertible bond, MTU has the right to recall the issued bond units at their nominal value (plus accrued unpaid interest) at any time on or after June 16, 2020, subject to a period of notice of minimum 30 days and maximum 60 days, either (i) if the quoted price of the common share rises to or above 130% of the applicable conversion price over a defined period, or (ii) if no more than 20% of the nominal value of the convertible bond issue is outstanding. In the event of such cancellation by MTU, and within the above-mentioned notice period, the bondholders have the right to request that MTU convert their bonds into shares, rather than repurchase them.

Taking into account the partial redemption of bond units in 2019 at a nominal value totaling €275 million and their cancellation as well as the conversion notices received since then from creditors of this convertible bond, the nominal amount outstanding as of December 31, 2022, was still €46 million (previous year: €48 million).

In 2019, MTU Aero Engines AG issued a senior unsecured convertible bond for a total nominal amount of €500 million. This bond is convertible into registered non-par-value shares in MTU. The convertible bond has an original maturity of 7.5 years and is divided into units of €100,000. It bears an interest rate of 0.05% p.a., payable annually in arrears.

Bondholders are entitled to convert their certificates into common shares in MTU Aero Engines AG for the first time on September 18, 2024. The initial conversion price was set at €378.4252, which represents a premium of 55% on the reference rate.

Under the terms of issue of the convertible bond, MTU has the right to recall the issued bond units at their nominal value (plus accrued unpaid interest) at any time on or after April 8, 2025, subject to a period of notice of minimum 30 days and maximum 60 days, either (i) if the quoted price of the common share rises to or above 130% of the applicable conversion price over a defined period, or (ii) if no more than 20% of the nominal value of the convertible bond issue is outstanding. In the event of such cancellation by MTU, and within the above-mentioned notice period, the bondholders have the right to request that MTU convert their bonds into shares, rather than repurchase them.

Other financial liabilities to banks

Revolving credit facility
In the year under review, the €600 million revolving credit facility concluded with five banks, which ran until October 28, 2023, was replaced ahead of schedule by a new revolving credit facility. This credit facility with a volume of €500 million was concluded with nine banks, has a term of five years until June 29, 2027, and can be extended twice by one year in each case at the company's request. The credit facility had not been drawn down as of the reporting date (previous year: €42 million drawn down in the form of guarantees).

The remaining available amount secures the mid-term financial flexibility of the MTU Group. The credit utilized is subject to interest at the customary market reference rate plus an additional margin.

The unused amount of the revolving credit facility is subject to a loan commitment fee.

Lease liabilities

Lease liabilities relate to liabilities under leases, particularly from the areas of real estate and engine leasing, recognized using the effective interest rate method. For information on their accounting treatment and a summary of the corresponding capitalized lease assets, please refer *Note 36 "Leases"* in the Notes to the consolidated financial statements.

Miscellaneous other financial liabilities

Financial liabilities arising from acquisition of stakes in programs
This item includes the deferred payment components arising from the increase in the stake in IAE-V2500 and the financed acquisitions of stakes in engine programs. These are deemed to represent financing transactions in view of the structure of the underlying agreements. For more information on program liabilities, please refer to *Note 28 "Financial liabilities" in the section "Financial liabilities arising from increased or new stakes in engine programs."*

The purchase price agreement signed by MTU in the fiscal year 2012 in order to increase its stake in the V2500 engine program by 5 percentage points to 16% made it necessary, among other things, to recognize a deferred financial liability contingent upon the number of flight hours performed over the next 15 years by the fleet of V2500 engines in service at the time of the stake increase.

The liability matures in 2027 and, as of the as of the closing date, reflects a nominal amount of U.S.$122 million (previous year: U.S.$168 million), which translates into €114 million (previous year: €148 million) at the exchange rate prevailing at the reporting date. As of December 31, 2022, the carrying amount of the purchase price liability was €108 million (previous year: €138 million) and is included in a hedging relationship for revenue-generating transactions in U.S. dollars.

Compensation payments within the scope of stakes in programs
This item reflects the required compensation payment agreements in connection with stakes in engine programs. These are deemed to represent financing transactions in view of the structure of the underlying agreements.

In the fiscal year, an agreement was concluded with the OEM Pratt & Whitney to repay the cumulative production-related compensation payments within the scope of MTU's membership in the consortium for the PW1100G-JM engine program by the end of 2021. In previous periods, the abovementioned compensation payment obligation was to be accounted for as a component of current refund liabilities, taking account of the estimations regarding amount and maturity. In addition to a fixed repayment amount of a nominal U.S.$265 million, the agreement concluded with the OEM in the reporting period now reflects a payment plan over six years at a fixed interest per. Taking account of the closing exchange rate as well as an interest rate in line with the risks and maturities concerned, the amount capitalized under other financial liabilities totals €219 million as of the closing date.

Contingent liabilities and other financial obligations

As of the reporting date, contingent liabilities amounted to €182 million (previous year: €207 million) and mainly related to the assumption of guarantees and warranties. As part of its ordinary activities, the Group furthermore incurred other financial liabilities comprising purchase commitments and future cash outflows for leases. These are additional to the liabilities reported in the consolidated balance sheet at the end of the reporting period. They relate to contractual obligations to acquire intangible assets, property, plant and equipment, and leased items.

In fiscal year 2019, MTU incurred income tax losses due to the partial repayment of a convertible bond in the amount of €276 million. MTU still expects confirmation from a tax audit that this is tax-deductible. Please refer to Note 37 "Contingent liabilities and other financial obligations" in the Notes to the consolidated financial statements for detailed information on contingent liabilities and other financial obligations.

Investitionen

[T30] Capital expenditure by class of asset

in € million	2022	2021	Change against previous year in € million	Change against previous year in %
Intangible assets	60	83	-24	-28.3
Property, plant and equipment	387	301	86	28.5
Financial assets	117	123	-6	-5.2
Program assets and acquired development work	26	18	8	46.6
Total capital expenditure	**589**	**525**	**64**	**12.2**

More information can be found in Note 39 "Consolidated segment report" in the Notes to the consolidated financial statements.

Capital expenditure on intangible assets

€53 million (previous year: €51 million) of the capital expenditure on intangible assets relates to self-generated development work in connection with stakes in engine programs, especially the Pratt & Whitney GTF™ engine families, the GE9X and the PW800 program. Detailed information on capital expenditure on intangible assets is provided in Note 14 "Intangible assets" in the Notes to the consolidated financial statements.

Capital expenditure on property, plant and equipment

Additions in the fiscal year 2022 mainly comprised advance payments and construction in progress totaling €185 million (previous year: €159 million) and other equipment, operational and office equipment totaling €180 million (previous year: €96 million). The capital expenditures mainly relate to the expansion of production capacity, especially at the sites in Munich and Hanover (Germany) and Nova Pazova (Serbia). Further, additions to right-of-use assets for leased items amounted to €63 million in the reporting period (previous year: €39 million). For further information on capital expenditure on property, plant and equipment and the application of IFRS 16, please refer to Note 15 "Property, plant and equipment" or Note 36 "Leases" in the Notes to the consolidated financial statements.

Capital expenditure on financial assets

Capital expenditure on financial assets, which totaled €117 million, included €87 million (previous year: €99 million) relating to additions to companies accounted for using the equity method, which impact earnings, and capital contributions to finance EME Aero, the joint venture launched in conjunction with Lufthansa Technik, and Ceramic Coating Center SAS, the joint venture with Safran Aero Engines. Additional information on financial assets is included in Note 16 "Financial assets" in the Notes to the consolidated financial statements.

Capital expenditure on program assets and acquired development work

Capital expenditure on other assets due to acquired program assets and acquired development work relates mainly to the PW800 engine and the Pratt & Whitney GTF™ engine family. Additional information on other assets is included in Note 17 "Acquired program assets, development work and other assets" in the Notes to the consolidated financial statements.

Liquidity analysis

One of MTU's key performance indicators is free cash flow. MTU determines its free cash flow by combining its cash flow from operating activities with its cash flow from investing activities and eliminating components of the latter (non-recurring cash flows) that lie outside the operational management of the core business. To arrive at the free cash flow of €326 million (previous year: €240 million), these non-recurring cash flows were therefore eliminated from the cash flow from investing activities. Following its standard practice, MTU identified term-related cash flows in connection with the acquisition of stakes on OEM engine programs and MRO programs, interest-bearing cash inflows in connection with sales financing arrangements and cash flows in connection with investments for the purpose of efficient liquidity management as non-recurring cash flows. An adjustment is also made for non-recurring cash flows in connection with the acquisition or divestment of material investments.

To arrive at the free cash flow in the reporting period, the adjustments made for the above non-recurring cash flows comprised compensation payments made (€12 million) to the airframe manufacturer in connection with the acquisition of the stake in the PW812 engine program (previous year: net cash outflows of €27 million, mainly for the acquisition of stakes in MRO programs), cash outflows in connection with interest-bearing aircraft and engine financing totaling €0 million (previous year: €21 million), and net cash inflows of €-14 million (previous year: €-31 million). in connection with the sale of Vericor Power Systems.

[T31] Consolidated cash flow statement (abridged)

			Change against previous year	
in € million	2022	2021	in € million	in %
Cash flow from operating activities	728	567	161	28.3
Cash flow from investing activities	–400	–345	–55	–15.9
+ Adjustment for non-recurring cash flows	–2	18	–20	<-100
Free cash flow	**326**	**240**	**86**	**35.8**
– Reverse effect of adjustment for non-recurring cash flows	2	–18	20	>100
Cash flow from financing activities	–224	–276	52	19.0
Translation differences	–3	3	–6	<-100
Change in cash and cash equivalents	**101**	**–51**	**152**	**>100**
Cash and cash equivalents at the beginning of the reporting period	722	773		
Cash and cash equivalents at the end of the reporting period	823	722		

Cash flow from operating activities

The cash flow from operating activities in the reporting period was higher than in the previous year. The main driver of this positive development was the cash-effective business growth, which benefited from the development of the U.S. dollar exchange rate in the reporting period. A negative factor was the increase in funds tied up in working capital.

Cash flow from investing activities

Capital expenditure on intangible assets amounted to €59 million (previous year: €82 million) and mainly comprised capital expenditure on development work for the Pratt & Whitney GTF™ engine family. Capital expenditure on property, plant and equipment, excluding the proceeds from asset disposals, amounted to €306 million, compared with €241 million in the previous year. The capital expenditure relates to the growing short-term engine leasing business and the expansion of MTU's production capacities, especially at its sites in Germany and Serbia. The net result of cash inflows and outflows relating to financial assets mainly results, on the one hand, from further cash inflows in connection with the sale of Vericor Power Systems in 2021 and, on the other hand, from the cash outflows for the capital increase at the joint venture EME Aero sp. z. o. o. Expenditure on program assets and acquired development work was €21 million in the reporting period (previous year: €23 million) and related primarily to the engine programs of the Pratt & Whitney PW800 engine family.

Cash flow from financing activities

The cash outflow in the reporting period was mainly due to the dividend payment of €112 million (previous year: €67 million) and payments for lease liabilities totaling €64 million (previous year: €34 million). Further, in the previous year loan repayments of €130 million were recognized.

Change in cash and cash equivalents

The increase in cash and cash equivalents results from the fact that the year-on-year increase in cash inflows from operating activities more than offset the higher cash outflows for investing activities and lower outflows for financing activities.

Net assets

Changes in balance sheet items

[T32] Consolidated balance sheet of the MTU Group

	Dec. 31, 2022		Dec. 31, 2021		Change against previous year	
in € million	in € million	in %	in € million	in %	in € million	in %
Assets						
Non-current assets						
Intangible assets and property, plant and equipment	2,534	27.5	2,379	28.7	155	6.5
Other assets	1,611	17.5	1,664	20.0	-52	-3.1
Total non-current assets	**4,146**	**44.9**	**4,043**	**48.7**	**103**	**2.5**
Current assets						
Inventories	1,514	16.4	1,380	16.6	134	9.7
Receivables/other assets	2,748	29.8	2,159	26.0	589	27.3
Cash and cash equivalents	823	8.9	722	8.7	101	14.0
Total current assets	**5,085**	**55.1**	**4,260**	**51.3**	**824**	**19.3**
Total assets	**9,230**	**100.0**	**8,304**	**100.0**	**927**	**11.2**
Equity and liabilities						
Equity	**3,107**	**33.7**	**2,760**	**33.2**	**347**	**12.6**
Non-current liabilities						
Provisions	714	7.7	968	11.7	-254	-26.3
Liabilities	1,630	17.7	1,457	17.5	173	11.9
Total non-current liabilities	**2,343**	**25.4**	**2,424**	**29.2**	**-81**	**-3.3**
Current liabilities						
Provisions/income tax liabilities	333	3.6	226	2.7	108	47.7
Liabilities	3,447	37.3	2,893	34.8	554	19.1
Total current liabilities	**3,780**	**41.0**	**3,119**	**37.6**	**661**	**21.2**
Total equity and liabilities	**9,230**	**100.0**	**8,304**	**100.0**	**927**	**11.2**

Assets

In the fiscal year 2022, intangible assets increased by €22 million (previous year: decreased by €7 million). The main drivers were additions of capitalized, self-created development expenses for the Pratt & Whitney Geared Turbofan™ engines.

Property, plant and equipment increased by €132 million (previous year: €90 million). This was mainly due to capital expenditure for construction in progress to increase production capacities in Germany and Serbia and the increase in other equipment and operational and office equipment in connection with the growth in engine leasing business.

The reduction in non-current other assets mainly comprised amortization of program assets for military and commercial engine programs and the impairment losses on compensation payments in connection with the PW1400G-JM and T408 engine programs. The positive business performance of and additional capital contributions at companies included in the consolidated financial statements using the equity method had a countereffect. For more information on program assets, please refer to Note 17 "Acquired program assets, development work and other assets" for the goodwill of program assets.

Inventories of raw materials and supplies rose by €65 million to €719 million in the reporting period (previous year: €654 million), while inventories of finished goods and work in progress also rose by €65 million to €749 million (previous year: €684 million).

The sales to inventory ratio was 3.7 (previous year: 3.2).

Trade receivables increased to €1,110 million (previous year: €946 million). Contract assets, net of the associated contract liabilities, increased to €1,137 million, up €241 million from December 31, 2021. The increase mainly related to the MRO segment and was driven by incidences of supply disruption and, at the same time, an increase in business activity. There were also receivables from tax authorities in respect of tax refunds amounting to €34 million (previous year: €89 million).

Cash and cash equivalents increased from €722 million in the previous year to €823 million. Cash and cash equivalents accounted for 8.9% (previous year: 8.7%) of total assets at the reporting date. For information on the cash flow statement, please refer to the section titled *"Financial situation – Liquidity analysis."*

Equity

[T33] Changes in equity

in € million	2022	2021
As of Jan. 1	**2,760**	**2,635**
Other comprehensive income		
Financial instruments designated as cash flow hedges	-34	-106
Changes in the fair value of equity investments		-6
Actuarial gains/losses on pension obligations and plan assets	151	26
Translation differences arising from the financial statements of foreign entities	16	62
Net income	333	231
Dividend payment to shareholders of MTU Aero Engines AG/dividend payment to non-controlling interests	-124	-80
Issue of shares due to conversion of the convertible bonds	2	13
Sale of treasury shares under the Restricted Stock Plan (RSP)	3	2
Sale of treasury shares in connection with the employee stock option program (MAP)		23
Share buy-backPurchase of treasury shares for RSP and MAP		-31
Changes in equity due to portfolio transactions	0	-9
Total change in Group equity	**347**	**125**
As of Dec. 31	**3,107**	**2,760**

Positive changes in equity

The main factors behind the increase in equity in 2022 were the net income for the period of €333 million (previous year: €231 million), which was due to actuarial gains of €151 million (previous year: €26 million) and translation differences of €16 million arising from the financial statements of foreign entities, which increased equity (previous year: €62 million). Further factors in the previous year were the effects of the sale of treasury shares in connection with the employee stock option program and conversions of the convertible bond issued in 2016.

Negative changes in equity

Negative changes in equity resulted principally from the dividend payment of €112 million to shareholders of MTU Aero Engines AG for the fiscal year 2021 (dividend payment for 2020: €67 million) and the reduction of €34 million in the fair values of hedging instruments (previous year: reduction of €106 million). In the previous year, negative factors also included the purchase of treasury shares in the amount of €31 million. The net reduction in equity from portfolio transactions in 2021 related to the sale of Vericor Power Systems LLC, the acquisition of the remaining 20% of MTU Maintenance Lease Services B.V., and the sale of the 10% equity investment in SMBC Aero Engine Lease B.V.

Liabilities

Within non-current liabilities, non-current pension provisions decreased by €244 million in the reporting period, from €905 million in the previous year to €661 million due, in particular, to a higher actuarial discount rate.

Non-current liabilities mainly contain the gross financial debt of €1,478 million (previous year: €1,338 million) and other provisions of €53 million (previous year: €63 million). Non-current liabilities represented 25.4% of total equity and liabilities as of December 31, 2022, which was lower than in the previous year.

Total equity and non-current liabilities increased by €265 million in the reporting period to €5,450 million (previous year: €5,185 million). This means that 131.5% (previous year: 128.2%) of the Group's non-current assets are financed through available non-current funds.

The current provisions recognized under current liabilities are pension provisions amounting to €46 million, just above the previous year's level of €44 million, income tax liabilities, which rose from €9 million to €70 million, and other provisions, which increased by €44 million to €217 million. Current liabilities also include refund liabilities to customers amounting to €2,041 million (previous year: €1,758 million), trade payables of €284 million (previous year: €165 million), contract liabilities totaling €708 million (previous year: €692 million), current financial liabilities of €319 million (previous year: €226 million), and a large number of other individual obligations.

The equity ratio increased by 0.4 percentage points year-on-year to 33.7% (previous year: 33.2%).

Financial performance indicators

At MTU's Capital Market Day in November 2021, the Group provided an initial outlook on its expected business development in the reporting year. This was confirmed on February 16, 2022, in connection with the announcement of the annual results for 2021.

Full-year revenue of between €5,200 million and €5,400 million and an increase in adjusted EBIT in the mid-twenty-percent range were forecast. Adjusted net income was expected to grow in line with adjusted EBIT. For the free cash flow, MTU forecast a cash conversion rate in the mid to high double-digit percentage range.

[T34] Forecast and actual results

in € million	Actual 2022	Change 2022 - 2021 in %	Forecast for 2022 as of Oct. 26, 2022	Forecast for 2022 as of July 27, 2022	Forecast for 2021 as of Feb. 16, 2022	Actual 2021
Revenue	5,330	27.3	between 5,400 and 5,500	between 5,200 and 5,400	between 5,200 and 5,400	4,188
Adjusted EBIT	655	39.9	Increase in low thirties % range	Increase in mid twenties % range	Increase in mid twenties % range	468
Adjusted net income	476	39.2	Development in line with adjusted EBIT	Development in line with adjusted EBIT	Development in line with adjusted EBIT	342
Cash conversion rate	69 %	−2.5	between 60 -70%	Mid to high double digit % range	Mid to high double digit % range	70 %

Revenue forecast

On February 16, 2022, the Executive Board forecast that revenue would rise to a range of between €5,200 million and €5,400 million in 2022 (revenue 2021: €4,188 million). The revenue forecast was confirmed when the half-year financial report was published on July 27, 2022. When the third quarter results were published on October 26, 2022, the guidance was increased to revenue of between €5,400 million and €5,500 million. The revenue realized as of year-end 2022 was €5,330 million, which was somewhat lower than the forecast range of between €5,400 million and €5,500 million.

Earnings forecast

MTU initially forecast that adjusted earnings before interest and income taxes (adjusted EBIT) would increase in the mid-twenty-percent range. This forecast was confirmed when the half-year report was published. As of the third quarter, the expectation for adjusted EBIT was an increase in the low thirty-percent range. At the end of the year, the increase in adjusted EBIT was 40% and thus above expectations.

In its initial forecast for 2022, the Executive Board anticipated that adjusted net income would grow in line with adjusted EBIT. This forecast was confirmed on July 27, 2022, and on October 26, 2022. Adjusted EBIT grew by 40% in the reporting period. By contrast, adjusted net income increased by 39% in 2022, which was in line with the expectations.

Free cash flow

On February 16, 2022, MTU set the target of achieving a cash conversion ratio (ratio of free cash flow to adjusted net income) in the mid to high double-digit percentage range. This forecast was confirmed with the company presented its half-year report on July 27, 2022. The forecast was specified in more detail as a range of 60% to 70% when the third-quarter results were published on October 26, 2022. This target was met as of December 31, 2022, with a free cash flow of €326 million. The cash conversion rate was 69% and therefore in line with expectations (previous year: 70%).

Overall assessment of business performance in 2022

MTU's business performance in 2022 was characterized by a strong recovery, despite the war in Ukraine. Revenue increased to €5,330 million, a year-on-year rise of 27.3% (previous year: €4,188 million). Before intersegment consolidation, the MRO segment contributed revenue growth of 31.9% while the OEM segment contributed 18.3% higher revenue.

MTU continued its investment and growth phase in 2022, which was dominated by development activities for engines in all commercial thrust classes and the expansion of production capacity at locations in Germany and other countries.

MTU's operating profit rose in both the OEM segment and the MRO segment in the reporting period; adjusted EBIT was €655 million (previous year: €468 million). The adjusted EBIT margin was 12.3% (previous year: 11.2%).

There was a corresponding increase in the free cash flow. Despite high investment in development assets, capacity expansion at sites in Germany and abroad, and significant downward pressure resulting from the continued pandemic-induced disruption of air traffic and the war in Ukraine, MTU achieved a disproportionately high increase in its free cash flow to €326 million (previous year: €240 million).

MTU essentially met, and in some cases exceeded, the forecasts published in mid-year and the more detailed guidance issued in the course of the year thanks to the business performance, which was favorable from the perspective of the Executive Board.

Non-financial performance indicators

The high priority given to climate protection is shown by the fact that reducing CO_2 emissions is an important environmental, social and governance (ESG) target. The ESG-related KPI CO_2 is a climate-oriented parameter that affects the variable compensation of the Executive Board and senior executives. Target achievement is based on Europe-wide implementation of the Green Europe eco-Roadmap, the climate-protection strategy for emissions from the European production sites in Munich, Hanover, Ludwigsfelde and Rzeszów. The objective of Green Europe is to reduce MTU's CO_2 footprint (measured by material Scope 1 and 2 emissions) by 60% by 2030 compared with the reference base (2019) by introducing sustainable measures, extending in-house emissions-free energy generation and stepping up the use of green energy. In addition, it applies the gold standard to compensate for unavoidable CO_2 emissions at the Munich location. As a result, operation of this location has been climate-neutral since 2021. Integration of the production sites in Canada and Serbia (which started operating in December 2022) in 2023 is currently being considered.

In the period under review, CO2eq emissions from the MTU Group's production sites totaled 47,125 metric tons (2021: 55,525). CO_2 emissions at the Munich site are decreasing. The reductions in the Group and at headquarters in Munich were attributable to the Green Europe climate strategy. MTU undertook high-quality offsetting of the remaining CO2eq emissions in Munich using the gold standard, so this location was climate-neutral in 2022.

Measurement of target achievement for the ESG target CO_2, which is relevant for management compensation, is based on the remaining CO_2 emissions as "maximum remaining CO_2 emissions" (calculated using the currently valid emissions factors) and "CO_2 abatement through sustainable measures" (calculated using the 2019 emissions factors), taking 2019 as the baseline. The twelve-month performance period used for this is December 1, 2021 through November 30, 2022 and thus differs from the reporting period. The outcome was 44,246 metric tons CO_2, which was below the target level of 54,000 metric tons thanks to consistent action to reduce CO_2 emissions and the purchase of green electricity. The target for abatement through sustainable measures was achieved with a reduction of 2,000 metric tons (target: 1,747 metric tons).

MTU AG (disclosures in accordance with the German Commercial Code [HGB])

The management report of MTU AG and the Group management report for the fiscal year 2022 have been combined in accordance with Section 315 (5) in conjunction with Section 298 (2) of the German Commercial Code (HGB). The annual financial statements of MTU AG were prepared in accordance with the provisions of the German Commercial Code (HGB) and are published together with the combined management report in the German electronic Federal Gazette (elektronischer Bundesanzeiger).

The business environment of MTU AG corresponds for the most part with that of the Group as described earlier under "Economic report."

Business activities

MTU AG develops and manufactures components for commercial and military aircraft engines and aero-derivative industrial gas turbines. The company also carries out maintenance of military engines. MTU has technological expertise, in particular, in low-pressure turbines, high-pressure compressors and turbine center frames, and in repair techniques and manufacturing processes. It is involved in important national and international technology programs and cooperates with the top names in the industry (GE Aerospace, Pratt & Whitney and Rolls-Royce).

Disclosures relating to results of operations

[T35] Income statement of MTU Aero Engines AG

in € million	2022	2021	Change against previous year in € million	Change against previous year in %
Revenue	**4,194**	**3,695**	**499**	**13.5**
Cost of goods sold	-3,912	-3,549	-363	-10.2
Gross profit	**282**	**145**	**137**	**93.9**
Selling expenses	-98	-94	-4	-4.5
General administrative expenses	-64	-60	-4	-7.4
Net other operating income/expenses	59	103	-44	-42.9
Net financial income/expense	216	169	47	27.6
Earnings from ordinary operating activities	**395**	**265**	**130**	**49.2**
Tax expense	-128	-67	-61	-91.2
Net profit for the year	**267**	**198**	**69**	**35.0**
Allocation to other retained earnings	-96	-86	-10	-11.6
Net profit available for distribution	**171**	**112**	**59**	**53.0**

Revenue

The principal revenue driver was further recovery of air passenger traffic, which was reflected, on the one hand, in rising demand for spare parts for programs that have already been established on the market for some time and, on the other hand, in an upturn in demand from fleet operators for new aircraft. A rebound in demand for new aircraft had already been registered in the second half of the previous year, when aircraft manufacturers

Airbus and Boeing gradually started to scale back the production restrictions resulting from the economic impact of the pandemic. Moreover, the change in the average euro/U.S. dollar exchange rate from U.S.$1.18 per euro to U.S.$1.05 per euro in the reporting period supported revenue in the commercial OEM business as most revenue is billed in U.S. dollars. A downside factor in the reporting period was the need to increase provisions for accrued compensation payments for aftermarket contracts in connection with stakes in engine programs. The allocations to provisions reflect changes in the creditworthiness of these aftermarket customers as a result of pandemic-related pressures and geopolitical and macroeconomic factors in the reporting period.

Cost of goods sold and gross profit

In 2022, there was an increase in the cost of goods sold, corresponding with the increase in business volume; however, the year-on-year rise was below revenue growth, principally due to economies of scale. By contrast, unlike the previous year, the cost of goods sold was affected by special items in the form of asset write-downs totaling €35 million in connection with the Russia-Ukraine war (previous year, write-downs of €65 million on assets of the PW1700G program). These relate to the termination of contractual relationships with Russian business partners. In all, the gross profit was above the prior-year level.

Selling expenses

Selling expenses rose by €4 million (4.5%) to €98 million in 2022 and administrative expenses increased by €4 million (7.4%) to €64 million, mainly due to changes in price calculations for material and personnel expenses and business-related capacity adjustments.

Net other operating income/expense

In the reporting period, this item was mainly influenced by net income from foreign currency translation, mainly due to the euro/U.S. dollar exchange rate, which changed from U.S.$1.13 per euro to U.S.$1.07 as of the reporting date, losses on the valuation of currency holdings and hedging transactions amounting to €8 million (previous year: gains of €34 million) and an offsetting effect of €60 million (previous year: €58 million) from income from adjustments to accrued expenses.

Net financial income/expense

Net financial income/expense for the reporting period contains investment income of €224 million (previous year: €200 million). Of this amount, €201 million (previous year: €140 million) comprises profit transfers from MTU Maintenance Hannover GmbH, Langenhagen, Germany, MTU Maintenance Berlin-Brandenburg GmbH, Ludwigsfelde, Germany, and MTU Versicherungsvermittlungs- und Wirtschaftsdienst GmbH, Munich, Germany.

The remaining investment income of €23 million (prior year: €60 million) comprises dividend payments from foreign investments, principally €14 million from MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China, and €9 million from MTU Aero Engines Polskla sp. z o. o., Rzeszów, Poland.

Tax expense

Income tax expense amounted to €128 million in the reporting period (previous year: €67 million). The current tax expense included in this figure amounts to €182 million (previous year: €61 million), including €18 million (previous year: €18 million) relating to prior periods. This is offset by deferred taxes of €15 million (previous year €19 million) relating to prior periods.

Net profit for the year and net profit available for distribution

In line with the business-related increase in the gross profit and financial income/expense compared with the previous year, earnings from ordinary operating activities and the net profit for the year.

Subject to the approval of the Supervisory Board, the net profit for the reporting period attributable to the shareholders of MTU Aero Engines AG takes into account the allocation of €96 million of the net profit for the period to retained earnings in accordance with Section 58 (2) of the German Stock Corporation Act (AktG).

Determination of the net profit available for distribution takes account of amounts excluded from distribution: €245 million (previous year: €224 million) from the capitalization of internally generated intangible assets (Section 248 (2) of the German Commercial Code [HGB]) and €17 million (previous year: €30 million) from the measurement of pension obligations (Section 253 (2) of the German Commercial Code [HGB]), taking into account, in both cases, the related deferred taxes. These were matched in full by free reserves pursuant to Section 268 (8) of the German Commercial Code (HGB) and Section 253 (6) of the German Commercial Code (HGB) as of the reporting date.

Subject to the approval of the Supervisory Board, a proposal will be put to the Annual General Meeting that the entire net profit available for distribution be used to pay a dividend of €3.20 per share (previous year: €2.10 per share). Subject to approval by the Annual General Meeting, the dividend for 2022 will be paid on May 16, 2023, and the total dividend payment will be €171 million (previous year: €112 million).

Disclosures relating to net assets and financial position

[T36] Balance sheet of MTU Aero Engines AG

	Dec. 31, 2022		Dec. 31, 2021		Change against previous year	
in € million	in € million	in %	in € million	in %	in € million	in %
Assets						
Intangible assets and property, plant and equipment	1,761	22.6	1,740	25.7	21	1.2
Financial assets	1,377	17.7	1,053	15.5	324	30.8
Non-current assets	**3,138**	**40.3**	**2,793**	**41.2**	**345**	**12.4**
Inventories	738	9.5	708	10.4	30	4.2
Receivables and other assets	2,923	37.6	2,461	36.3	462	18.8
Cash and cash equivalents	726	9.3	627	9.2	99	15.8
Current assets	**4,387**	**56.4**	**3,796**	**55.9**	**591**	**15.6**
Prepaid expenses	**20**	**0.3**	**13**	**0.2**	**7**	**55.0**
Deferred tax assets	**231**	**3.0**	**183**	**2.7**	**48**	**26.2**
Total assets	**7,776**	**100.0**	**6,785**	**100.0**	**992**	**14.6**
Capital						
Subscribed capital	53	0.7	53	0.8	-0	-0.8
Capital reserves	667	8.6	665	9.8	2	0.3
Retained earnings	1,445	18.6	1,347	19.9	98	7.3
Net profit available for distribution	171	2.2	112	1.7	59	53.1
Equity	**2,336**	**30.1**	**2,176**	**32.1**	**160**	**7.4**
Pension provisions	762	9.8	739	10.9	23	3.1
Other provisions	2,346	30.2	2,066	30.4	280	13.5
Provisions	**3,108**	**39.9**	**2,805**	**41.3**	**303**	**10.8**
Liabilities						
Bonds	1,155	14.9	1,158	17.0	-3	-0.2
Advance payments received	406	5.2	270	4.0	136	50.4
Trade payables and other liabilities	610	7.8	209	3.1	401	>100
Liabilities	**2,171**	**27.9**	**1,637**	**24.1**	**534**	**32.7**
Deferred tax liabilities	**161**	**2.1**	**167**	**2.5**	**-6**	**-3.6**
Total equity and liabilities	**7,776**	**100.0**	**6,785**	**100.0**	**991**	**14.6**

In the fiscal year 2022, intangible assets in the amount of €77 million were capitalized (previous year: €48 million). €47 million (previous year: €43 million) was invested in internally generated development assets and €14 million (previous year: €0 million) was invested in acquired development work (compensation payments), especially for the GTF™ engine family and the PW800, PW500 and GE9X engine programs. By contrast, a total write-down of €37 million was recognized on acquired and internally generated development assets in the reporting period. This relates to the PW1400G-JM engine program, which was intended for the Russian Irkut MC-21 and has been permanently written down as a consequence of the Russia-Ukraine war.

Tangible fixed assets increased, principally as a result of expansion and modernization of the Munich site and the purchase of new and replacement machinery and tools/fixtures.

Financial assets increased by €324 million to €1,377 million (previous year: €1,053 million). This resulted principally from capital contributions to the affiliates MTU Maintenance Lease Services B. V., in the amount of €217 million, and MTU Maintenance Serbia d. o. o, in the amount of €14 million. Moreover, in light of the updated financing requirements of foreign subsidiaries, loans totaling €70 million granted as current loans in previous years were reclassified to non-current loans in the reporting period.

For business-related reasons, inventories rose by €30 million to €738 million in 2022, but despite higher inventories to mitigate the supply chain risks, this was slower than the year-on-year increase in revenue due to working capital management.

Compared with the previous year receivables and other assets were €462 million higher (previous year: €2,461 million) so they rose faster than revenue.

The business-induced increase in trade receivables to €760 million (previous year: €643 million) corresponded with the rise in revenue. The receivables from investments increased from €776 million to €934 million. This was attributable to the ramp-up of series and new engine business for the GTF programs and rising sales of spare parts, especially for the V2500 program. The change in receivables from affiliated companies relates to claims under profit and loss transfer agreements and the financing of subsidiaries.

Other assets increased by €165 million to €351 million (previous year: €186 million), mainly as a result of compensation payments made in 2022 in connection with stakes in civil commercial engine programs, especially for the GTF family. The compensation payments serve to finance maintenance contracts over the service life of the respective programs. Other factors contributing to the increase were claims to refunds of income taxes and input taxes. Since the commercial OEM activities are billed in U.S. dollars, the development of receivables was also attributable to the change of the U.S. dollar exchange rate prevailing on the reporting date from U.S.$/€1.13 to U.S.$/€1.07.

The change in cash and cash equivalents was dominated by the year-on-year improvement in the operating business. Including dividend distributions, this more than offset the capital expenditures and financing expenses.

Equity comprises the capital stock less the nominal amount of treasury shares, capital reserves, retained earnings, and the net profit available for distribution.

The development of provisions for pensions reflected the moderate reduction in the discount rate set by the regulator for the accounts prepared in accordance with HGB and an adjustment in the actuarial valuation parameters. The increase in miscellaneous provisions results from the increase in revenue in 2022 and the related rise in accruals for invoice corrections in connection with stakes in commercial engine programs.

The €534 million increase in liabilities to €2,171 million in the reporting period (previous year: €1,637 million) mainly resulted from an increase of €367 million in miscellaneous liabilities. Here, the agreement concluded with the OEM Pratt & Whitney in the reporting period on repayment of the production-related compensation payments within the scope of MTU's membership in the consortium for the PW1100G-JM engine program that had accumulated up to year-end 2021 needs to be taken into account. In previous periods, this liability to make compensation payments was accounted for in other provisions for invoicing corrections, taking into consideration the need to estimate their amount and reliability. The agreement concluded with the OEM in the reporting period comprises a fixed settlement amount with a nominal value of U.S.$265 million and a payment plan comprising fixed installments over a six-year period. Taking into account the exchange rate prevailing on the reporting data and the interest rate reflecting the risk and maturity, this liability was valued at €219 million on the reporting date. Furthermore, advance payments received for orders increased by €136 million and liabilities to affiliated companies in connection with Group financing operations increased by €119 million. The other liabilities mainly contain obligations to employees in the amount of €91 million (previous year: €86 million) and liabilities relating to investments in engine programs.

Other disclosures

The opportunities, risks and future development of MTU AG essentially correspond to the opportunities, risks and future development of the MTU Group as described below under *"Forecast"* and *"Risk and opportunity report."*

As the Group's parent company, MTU AG is integrated in the Group-wide risk management system that is described in detail in the *"Risk and opportunity report."* The description of the internal control system of MTU AG required under Section 289 (4) of the German Commercial Code (HGB) can be found under *"Internal control and risk management system for the Group accounting process."*

For further information on the use of financial instruments, please refer to the *Notes to the consolidated financial statements* and to the *"Use of financial instruments"* section of the Risk and opportunity report.

Due to the allocation of business within the Group, the outlook for MTU AG corresponds closely with the outlook for the commercial and military engine business (OEM) and, in view of the profit and loss transfer agreements with the German subsidiaries, with the outlook for the commercial maintenance (MRO) business, which are presented in the section headed *"Future performance of MTU."*

Based on the operational planning for the Group and the expected distribution of business between the Group companies and their dividend plans, the Executive Board expects that in 2023 the annual financial statements for MTU Aero Engines AG prepared in accordance with HGB will show a year-on-year increase in revenue and earnings from ordinary operating activities in the mid-double-digit percentage range.

Forecast

Macroeconomic conditions

The IMF forecasts that global GDP growth will slow in 2023. Following growth of 2.9% in 2022, the IMF expects global economic growth to drop to 2.1% in 2023. One third of the world will probably experience a recession in 2023. The OECD is predicting a similar economic trend in 2023, with a growth rate of 2.2% (source. OECD Economic Outlook, September 2022). The main reasons for the anticipated drop in global GDP growth can be traced to events in recent years: the Covid-19 pandemic, Russia's invasion of Ukraine and natural catastrophes as a result of climate change.

According to the OECD, further interest rate rises will be needed in most major economies to ensure a sustained reduction in inflationary pressure. A more restrictive monetary policy and stabilization of supply chains should ease the inflationary pressure in 2023.

The IMF anticipates that annual GDP growth will slow further in North America and Europe in 2023: In the USA, growth will drop from 1.6% in 2022 to 1.0% in 2023, while in the euro zone it will decline from 3.1% to 0.5%.

Shortly before the abrupt end of the zero-Covid policy at year-end 2022, the IMF forecast that Chinese GDP would increase from 3.2% to 4.4% in 2023. The abandonment of the zero-Covid policy on December 7 was initially followed by a sharp rise in Covid infections. The IMF projected that China could make a positive contribution to the global economy from mid-year, but stressed that its forecast was clouded by uncertainty. The future development of the world economy depends to a large extent on monetary policy, energy prices in Europe, the development of the war in Ukraine and how China develops.

Sector-specific conditions within the aviation industry

The high uncertainty about the development of demand is overshadowing the sector in 2023. The slowdown in global economic growth, rising energy costs and general geopolitical uncertainty are likely to adversely affect both the passenger and the cargo market. However, tailwind is coming from the re-opening of China following the end of the zero-Covid policy.

In its forecast of December 2022, IATA predicts a slight upturn in air passenger traffic from 71% of the pre-pandemic level to 85% in 2023. Cargo traffic is expected to decline by 4.1%. This assessment takes account of the re-opening of China, the Ukraine conflict and the emerging global economic slowdown.

According to the IATA forecast, global revenue in the airline sector should recover from U.S.$727 billion in 2022 to U.S.$779 billion in 2023, which would be a good 93% of the pre-crisis level. It forecasts that the sector will be back in the black with a profit of U.S.$ 4.7 billion. IATA's latest forecast is based on an oil price of U.S.$92 per barrel in 2023, which would reduce pressure on the airlines compared with the price of U.S.$103 per barrel in 2022.

Aircraft manufacturers Airbus and Boeing are starting the year 2023 with a high order backlog with orders for 11,817 planes. Both are basing their planning on a further recovery in demand and long-term growth in air traffic Production rates for the A320 and Boeing 737 model ranges are to be increased further, from 50 A320 aircraft a month at present to 75 a month by 2025 and from 30 to 50 Boeing 737 MAX aircraft a month in 2025 or 2026 (sources: FlightGlobal and Cirium). The planned ramp-up of production at Airbus and Boeing represents a challenge for suppliers due to personnel and material shortages and low financial reserves following the pandemic. In view of the sharp drop in international long-haul traffic, production forecasts for the twin-aisle market are more cautious. For example, planned monthly production of the 787 is six to seven aircraft, with a planned increase to ten per month in 2025 or 2026. Boeing assumes that it will deliver the first Boeing 777X aircraft in early 2025.

Future performance of MTU

In view of the impact of the Covid-19 pandemic, the general economic situation and, in particular, the geopolitical developments, especially in connection with Russia's invasion of Ukraine, there could be problems or delays affecting development work, supply chain and demand-induced changes or postponements in series production and maintenance of engines on the aftermarket, which could affect the forecast for the principal financial KPIs.

Expenditure on new products and services

Global progress in containing the pandemic and the progressive removal of travel restrictions are bringing a continuing recovery in the aviation industry. However, this positive trend is held back by ongoing restrictions on flights as a result of the Russia-Ukraine war. Overall though, the aviation sector is steadily recovering, not least due to the change in China's pandemic policy, and it is expected that flights will return to the pre-crisis level in 2024.

The recent ramp-up of engine production should continue in 2023. Similarly, there should be corresponding growth in market demand for spare parts and the MRO business.

Development work should also continue to grow in 2023, not least because of the participation in the next generation fighter aircraft, the Future Combat Air System (FCAS).

For the start of the ramp-up of engine production rates and to secure its long-term competitiveness, MTU is investing a substantial amount to expand the highly productive manufacturing and logistics capacity at its headquarters in Munich, Germany.

Moreover, expansion of capacity will continue, especially in China.

Outlook for 2023

Target

MTU's targets for the fiscal year 2023 are as follows:

[T37] Outlook for 2023

in € million	Forecast for 2023	Actual 2022
Revenue	Between €6.1 billion and €6.3 billion	5,330
Adjusted EBIT-Margin	Stable adjusted EBIT-Margin	12.3 %
Adjusted EBIT	Growth in line with Revenue	655
Adjusted net income	Growth in line with adjusted EBIT	476
Free cash flow	Significant positive free cash flow on prior year level	326

MTU forecasts that revenue and earnings will increase in 2023 and that it will report a significantly positive free cash flow.

Revenue by operating segment

Within the OEM business, MTU assumes organic revenue growth of around 30% in the commercial series business. Organic revenue growth in the commercial spare parts business should be in the high teens- to low twenty-percent range.

Revenue in the military engine business is expected to grow by around 10% in 2023. Revenue in connection with development work for the FCAS will also make a contribution to this.

On a U.S. dollar basis, MTU forecasts that its commercial maintenance business will grow in the high-teens percentage range in 2023, with a high proportion of revenue coming from the PW1100G-JM. Its share of MRO revenue should be in the mid- to high-thirty-percent range.

In view of this, the total revenue of the MTU Group in euros is expected to be between €6.1 and €6.3 billion.

This estimate is based on an average exchange rate of the U.S. dollar to the euro of 1.10.

Operating profit

MTU expects adjusted EBIT to increase in 2023, while the adjusted EBIT margin (relative to revenue) should be stable year-on-year.

Adjusted net income in 2023 is expected to develop in line with adjusted EBIT.

Free cash flow

Capital expenditure will remain high in 2023. Moreover, higher working capital reserves will be held to safeguard delivery capability. However, MTU intends to offset these expenses through its operating business and to generate a clearly positive free cash flow around the prior-year level.

Future dividend

It is MTU's policy to pay an attractive dividend. Despite all current and future challenges and based on the overall forecast of future business developments of MTU in 2023, the company aims to further increase the dividend payout ratio. The aim is a payout ratio of between 30% and 40%.

Employees

An increase in personnel capacity is expected in both operating segments in 2023. This will comprise a high proportion of IT personnel as well as engineering capacity for the development of the Next European Fighter Engine.

Research and development

In 2023, MTU's research and development activities will focus on engine efficiency – concentrating on the ongoing development of its key components: low-pressure turbines, high-pressure compressors and turbine center frames. In addition, the company is working on new technologies for long-term projects aimed at decarbonizing aviation. The focus is on the water-enhanced turbofan (WET) and the flying fuel cell (FFC). The aims are to reduce fuel consumption and emissions and extend repair cycles. Furthermore, development work in the military business is dominated by work on the Next European Fighter Engine. Detailed information on research and development activities, including the targeted medium- and long-term reductions in fuel consumption and emissions, is provided under *"Research and development."*

Overall forecast of future business performance in 2023

The Executive Board anticipates that business will develop positively: Revenue should rise significantly again and MTU should continue to post strong adjusted EBIT. Stepping up development activities and capital expenditure again in 2023 will provide a sound basis for the sustained long-term growth of MTU's business.

MTU is monitoring the possible effects of the macroeconomic situation, the progress in checking the pandemic, and the Russia-Ukraine conflict on its business performance and will revise its guidance during the year if necessary.

Risk and opportunity report

Risk report

Risks are an inherent part of any entrepreneurial activity. To enable it to take best advantage of market opportunities and to identify and manage the risks involved, MTU has an integrated opportunity and risk management system. This is linked to the Group's value-oriented performance indicators and its organizational structure. The system is based on the internationally recognized COSO II Enterprise Risk Management Framework. To assist in implementing risk management in the MTU Group, the central risk management function provides the risk owners with a variety of information and tools. These include the MTU risk guidelines and risk manual and extensive checklists, which provide guidance and operational support in the risk management process.

The systematic consideration of significant risk factors serves as a fundamental basis for value-oriented management of the MTU Group and ensures lasting business success. MTU identifies risks early on, analyzes their possible consequences and devises appropriate risk mitigation measures. The key areas of risk exposure are:

- macroeconomic and strategic risks,
- market and program risks,
- development and production risks,
- other risks arising from business operations.

Strategy and risk management system

Control environment

MTU regards a suitable control environment as being essential for a functioning risk management system. The main elements of this are:

- management style and philosophy,
- integrity and ethical values,
- no-blame culture,
- staff training and development.

The MTU Principles require a constructive approach to mistakes, and the company's leadership values include a commitment to actively driving change, creating an atmosphere of trust, and ensuring continuous improvement. This is supported by lean management in all areas of the company, which also aims to create a culture that ensures a functioning risk management system.

Risk management objectives and risk strategy

The objectives of MTU's risk management system are to create transparency with regard to all risks and opportunities, to ward off risks to MTU's status as a going concern and to safeguard the company's future business success.

The company does not limit itself to ensuring compliance with statutory requirements. Rather, it seeks to integrate its opportunity and risk management system into all processes in the company, from financial planning, control and reporting processes right through to monthly reporting to the Executive Board and the Supervisory Board. Risk management also takes place in other areas of the company; for instance, it is a key component of project management.

Identification, analysis and management of risks

MTU regards risk management as a continuous process that ensures responsible behavior when dealing with specific risks to organizational units and general risks affecting several units or the entire Group.

The Group's risk inventory, which encompasses all organizational units and all risk factors to which MTU is exposed, forms the basis for identifying risks. In accordance with the COSO II Framework, it is divided into governance and compliance, strategy and planning, operations and infrastructure, and reporting. In the interests of a more detailed assessment of risks, MTU has divided this framework into 15 risk categories covering all organizational units. MTU also examines sustainability risks inherent in its business activities that may affect third parties.

Operational risk management takes place at the level of the individual, organizationally separate units and in the subsidiaries. These are responsible for identifying, assessing, controlling and monitoring the risks in their specific areas, and documenting them in a central risk management tool. To this end, the organizational units use a general risk checklist derived from the risk inventory. The mandatory threshold for reporting to the central risk management function is €5 million over the defined three-year assessment period. The establishment of risk maps and risk reporting take place in parallel with the quarterly financial statements. Risks occurring during the year that could threaten the company's status as a going concern are reported immediately to the central risk management function. Risks are assessed using uniform definitions of the probability of loss/damage and as possible deviations in the Group performance indicators “adjusted EBIT” and “liquidity” (cash) compared with current operational planning figures. Risk are presented gross, before taking risk mitigation measures into account. In addition to these financial risks, risk management also explicitly includes non-financial risks.

The central risk management function aggregates and consolidates the reported risks. It also provides assistance with the risk management process, prescribes uniform methods and tools, and evaluates the Group's overall risk position. Furthermore, it supports the work of the cross-organizational Risk Management Board, which performs central control and monitoring functions for the Group. At its quarterly meetings, the Risk Management Board discusses the interactions between individual risks, ensures that all risks have been reported in full, and assesses the risk exposure of the Group as a whole.

Risk reporting and risk communication

MTU's Executive Board is informed quarterly of the Group's current risk situation. The report to the Executive Board is agreed with the Risk Management Board and is structured on the basis of the segments. This report presents the company's Top Risk Map, which covers all risks and opportunities exceeding €20 million over a three-year period. A risk assessment is then performed in this context, taking account of the amount of damage, the probability of occurrence and the identification of compensatory countermeasures.

The Supervisory Board's Audit Committee is also given an update of the MTU Group's risk position on a quarterly basis. The most important issues from the previous risk review are also presented in monthly reports to the Executive Board and the Supervisory Board.

Monitoring the risk management process

Monitoring the risk management process is crucial to ensure its proper functioning and ongoing development.

The system used for the early recognition of risks is audited by the auditor. In addition to this, the risk management system is monitored and verified by other functions and Group bodies:

- peer-group comparisons and benchmarking,
- process reviews by the Risk Management Board in the form of a self-assessment,
- regular process and effectiveness audits by Internal Audit,
- monitoring by the Audit Committee and/or Supervisory Board.

Macroeconomic and strategic risks

Macroeconomic risks

(Business environment risks, country risks)
Within the aviation industry, MTU is exposed to competition in the development, production and maintenance of engines, engine modules and engine components. This business is cyclical and reacts sensitively to demand for passenger and cargo traffic. It is influenced by the general macroeconomic situation (GDP and trading volumes, exchange rates and raw material prices).

Demand from airlines for new aircraft and MTU's commercial engine products (new engines and spare parts) and their financing capability are heavily influenced by passenger numbers. A deterioration in the macroeconomic situation and the related demand for air traffic reduces use of the existing fleet of aircraft and demand for new aircraft. This represents a risk for MTU's business. Moreover, high competitive pressure among airlines could have a negative effect on individual airlines, which are potential direct or indirect MTU customers.

Unlike the situation in the previous year, the Covid-19 pandemic is no longer a central issue. The classification of the associated risks (new variants of concern, China's zero-Covid policy) has been reduced to "unlikely." The focus has now switched to local Covid-19 outbreaks (risk classification: possible), the escalation of political conflicts, wars and trade restrictions (risk classification: possible), staff shortages in the industry and airport and airline operators (risk classification: almost certain), the development of energy prices and exchange rates and, last but not least, the risk of recession in many economies (risk classification: almost certain). In the mid- to long-term, the risks arising from the climate change and more stringent emissions regulations (risk classification: possible) need to be addressed.

The company's ability to make appropriate predictions and plans for its business, especially in the short- and mid-term, is still hampered by the unprecedented situation and the complex interaction of geopolitics, the climate crisis, economic development and pandemics. Although MTU consults with government agencies, industry associations and external aviation analysts at national and international level, there is necessarily a certain amount of uncertainty affecting its ability to adequately to forecast the impact of these risk factors on its business. Incorrect forecasts could have a considerable negative effect on the company's business activity, cash flows, results of operations and financial position.

The risk factors could also confront MTU with considerable operational challenges, especially if it has to temporarily shut down production sites and research and development (R&D) locations to protect the health and safety of its employees, for example, in response to a pandemic, or there is other disruption at its workplaces. Moreover, MTU's business operations could also be affected by state restrictions on the movement of people, raw materials and goods to, from and within its locations and those of its suppliers.

MTU could also be affected by disruption of supply chains. Some suppliers might have to temporarily suspend operations due to state-imposed restrictions to combat risks, for example, as a result of a pandemic or in connection with sanctions resulting from the geopolitical situation, or be unable to meet delivery obligations due to staff shortages, confronting MTU with further short- or mid-term challenges and business disruption. Therefore, MTU could be exposed to risks in respect of costs that are necessary to meet its contractual commitments as well as risks to its product supply schedules. Moreover, in some cases MTU's customers and downstream operations are affected by considerable staff shortages. Following the weakening of the Covid-19 pandemic in the USA, Europe and Asia, airlines and airports are now affected by recurrent disruption in handling and cancellation of flights.

As a mid- to long-term effect of these risk factors, MTU could face more rapid changes in usage patterns or aviation regulations, which could adversely affect its business model. There is already a public debate about the social, economic and ecological implications of air travel and air cargo driven by the ongoing global climate debate. This has heightened personal and corporate awareness of travel and consumption behavior. Potential changes in usage patterns and the applicable regulations could be intensified and given new momentum by experience during the Covid-19 pandemic, e.g., online video conferencing as a substitute for business trips. If a reduction in travel and altered consumer spending patterns are regarded as socially desirable by the general public, this could have a significant negative impact on MTU's business model.

In particular, purely economic aspects will play their customary central role for air traffic alongside the consequences of the global debate on climate policy. In its October 2022 World Economic Outlook, the International Monetary Fund (IMF) warns of the risk of a global recession. About a third of the global economy could contract in 2023. The IMF estimates that the impact of the monetary policy tightening by the U.S. central bank to combat high inflation will be felt worldwide, with the strength of the U.S. dollar versus the currencies of emerging and development countries increasing inflationary and debt pressures.

A deterioration in the economic situation has the potential to reduce future growth in air traffic and thus demand for commercial engine products. Protectionist measures taken in some countries before the pandemic are a further risk factor. These include the trade conflict between the USA and China. Protectionist measures hold back the volume of trade and countries' economic output and therefore reduce cargo and passenger traffic.

Political crises and restrictions on air traffic as a result of wars, terrorist attacks or natural catastrophes are a constant risk to air traffic and to MTU's engines business. Following Russia's military attack on Ukraine, the international community, especially the EU and the USA, imposed extensive economic sanctions on Russia. As a matter of course, MTU supports all sanction regulations and is in full compliance with them. For example, all deliveries and data transfers to Russia have been halted and payments to Russia and Russian recipients have been suspended. Furthermore, MTU has halted the signing of any new contracts with Russian involvement for an indefinite period of time. Contract negotiations that were already underway were halted with immediate effect. Generally speaking, MTU has only very limited MRO business with customers in Russia and no presence in the region. In the OEM business, it is involved in the PW1400G-JM engine program, which was intended for use in a Russian mid-haul jet (Irkut MC-21). This program has also been halted. Regardless of this, the company is constantly monitoring the situation, including its effects on global material supplies. Potential impacts to MTU's supply chain are being assessed continually and factored into the procurement strategy. The direct impact of the war in Ukraine on global air traffic and supply chains is limited at present. The current reduction in global air traffic as a result of embargoes on flights and sanctions is about 3%. However, further escalation of the conflict, for example, beyond the borders of Ukraine and Russia, could very quickly result in a significant drop in air traffic and demand for commercial engine products in the countries and regions affected, which could adversely affect MTU's future business performance.

Risks arising from corporate strategy

(Competition/market, development/technology)
The main forms of strategy risk are misjudgments when taking decisions about investment in engine programs, the establishment of new sites and possible M&A activities. During the decision-making phase of a program, highly qualified specialists perform cost-benefit analyses based on set procedures that include the obligation to carry out a risk analysis on the basis of different scenarios. MTU's business model is based on long-term processes, particularly in the OEM segment. Many years of development, preproduction and volume production may lie between the decision to invest in a new commercial engine and the breakeven point. The risk is that the original economic and technological parameters might change over time, hence the need for frequent reassessments that take into account the most recent economic and technological developments. A decisive factor in this regard is, in particular, the success of the aircraft platforms on which the engines are deployed. MTU counters such strategy risks through a broad portfolio. This means that the company limits the impact of an individual program or aircraft platform by holding an interest in a wide range of products across all thrust classes.

In the longer term, a further identifiable risk, in addition to that arising from MTU's strategic decisions, is the arrival on the market of new competitors, e.g. from Russia or China. But given the high barriers to market entry, this risk is currently not regarded as critical. Changes in expectations of growth in air traffic and the aircraft industry, climate-related regulation and price increases or a reduction in the number of aircraft sold could lead to considerable negative impacts or further adjustments of the assumptions and estimates underlying the assessment of MTU's assets and liabilities and the presentation of MTU's financial position.

The engine industry is dominated by high investment both as development compensation payments to the engine OEMs and as development work by MTU at the start of a new engine program. The long product lifecycles of both aircraft and engine programs have to be taken into account when assessing the return on these investments.

Empirical observation indicates that the lifecycle of successful engine programs for commercial aircraft is well over 30 years from the initial purchase until the end of the program. In view of the long product lifecycle, the estimation requirements outlined above relate to long-term developments. Therefore, updated assumptions (for example, changes in the competitive situation, expectations of growth in air traffic and the aircraft industry, a deterioration in the number of aircraft sold, which could affect the creditworthiness of the Group's customers) have a considerable impact on MTU's systematic estimates and thus on its key financial indicators.

Given the after-effects of the Covid-19 pandemic, the impact of the Russia-Ukraine war and the resulting influence on the macroeconomic environment, demand for passenger flights remained below the pre-crisis level in 2022. Nevertheless, MTU's commercial business posted a significant upward trend both in the sale of new engines and in the aftermarket business. The commercial MRO business also reported a strong increase in demand. The impact of the Covid-19 pandemic and the war in Ukraine, especially in the form of supply chain problems and capacity constraints, as well as macroeconomic developments make it difficult for the company to make estimates and assumptions. The estimates and judgments are derived from assumptions based on the currently available information and effects of dynamic macro- and microeconomic factors on the aviation industry as a whole and on the business partners of relevance for MTU. Changes to these assumptions and estimates could have a highly negative impact on MTU's business activities, cash flow, results of operations and financial position.

Substitution risks arising from disruptive technologies

(Development/technology, environmental risks)
New aircraft and propulsion systems are currently being investigated in order to make a contribution to meeting the ambitious climate targets. In 2021, Airbus presented three aircraft concepts that could facilitate emission-free commercial flights, with an increased focus on hydrogen. Modified engines should allow direct combustion of this volatile gas. According to Airbus, this technology could come into use from 2035. While combustion of hydrogen in modified engines would hardly alter MTU's present business model, electric propulsion systems are in principle a substitution risk for conventional engine technologies. However, they do not yet come anywhere near the performance required to power a large passenger or freight aircraft. Together with its research partners, MTU is conducting studies to examine all the conceivable concepts in order to factually assess the opportunities arising from alternative engine concepts and make use of them as appropriate. Among the key results from these studies are:

/ Propulsion systems based on electric batteries are suitable today for applications requiring low performance and short duration of use, such as general aviation and urban mobility. With improvement in the storage capacity of batteries (5% per year), they could be used in several years on commuter aircraft and in about 30 years on regional aircraft. At the moment, there are no known battery concepts with sufficient capacity for short- and medium-haul aircraft, let alone for long-haul aircraft, which together represent an important market for MTU.
/ Hybrid propulsion systems combine various power generation and fuel systems, for example, a kerosene-fired gas turbine and a battery-powered electric engine. Potential benefits are additional freedom in the design of aircraft and propulsion systems and integration of the engine. The focus is generally on reducing energy consumption rather than on the climate impact. However, the targets of the Paris Agreement already cover all climate-related emissions. To identify the potential of further hybrid architectures as early as possible, MTU is involved in studies to evaluate such concepts. However, as yet they have not shown any major benefits compared with conventional propulsion systems in terms of energy consumption or climate impact.

- Considerable progress has been made in the development of fuel cells in recent years. However, their present performance potential is not sufficient for commercial aviation. In the long term, however, in conjunction with liquid hydrogen fuel, they have far greater potential for use in aviation than batteries. Together with the German Aerospace Center (DLR), MTU has therefore started working on the development of an optimized fuel cell for use in aviation as part of a national funding project. The aim is to test a prototype on a Dornier Do228 in flight by the middle of this decade.
- CO_2 is used as the starting product for the production of synthetic fuels. This significantly improves CO_2 performance by 80% or more, depending on the production process. The big advantage of sustainable aviation fuel (SAF) is that it is a “drop-in” fuel, in other words, no technical modifications to the aircraft, engine or airport infrastructure are necessary. In initial trials, SAF has also shown considerable potential to reduce condensation trails and their climate impact. SAF is therefore the technology that could bring a direct improvement in the climate impact of the present fleet. MTU Aero Engines is involved in research into SAF through its membership of the Bauhaus Luftfahrt research institute in Munich and aireg – Aviation Initiative for Renewable Energy in Germany e.V., which is based in Berlin. This not-for-profit initiative, where MTU leads the Fuel Utilization Working Group, is promoting the availability and use of renewable energies in aviation to enable the sector to achieve its ambitious carbon reduction targets.

From today's perspective, the fields in which MTU currently operates will not be affected by actual substitution risks in the foreseeable future. Nevertheless, MTU will continue to keep a close eye on developments in the field of electric motors, batteries and, especially, fuel cells, and compile further studies so it can react and, above all, participate in a timely fashion. In parallel, MTU is permanently working to improve the efficiency of conventional engines, thus continuously raising the ecological and economic access barriers for any substitute products. In addition to the substitution risks, risks could arise from climate-related regulations in the future. At present, there are no indications of specific activity by the regulatory authorities. Nevertheless, MTU is carefully monitoring developments in its field and will examine any emerging regulatory activities to identify potential strategic risks.

MTU does not currently see any strategy risks that could jeopardize its status as a going concern.

Market and program risks

(Competitive/market risks, program/project risks)
The production of engine modules and components for aircraft is characterized by intensive competition between market participants. MTU is exposed to this competition in all aspects of its two operating segments: the commercial and military engine business (OEM) and the commercial maintenance business (MRO).

In its OEM segment, MTU participates in programs to develop and build new engines, which its OEM partners offer to manufacturers of commercial and military aircraft, airlines and governments. Some of these programs compete with other engine programs for installation in the same aircraft type. Therefore, MTU's success depends partly on the ability of its OEM partners to secure orders from manufacturers, airlines and governments for the engine programs that MTU is involved in. In addition, through its stakes in engine programs, MTU also competes with other producers of engine modules and components (some of which are highly specialized and may offer directly competing technology) as well as with the OEMs, which may possibly decide to source development work, components and parts internally rather than from MTU.

As well as competition in the new engines business, MTU's competitive situation in the OEM segment includes the sale of engine parts and components in the aftermarket business. The aftermarket business is highly significant for MTU because the success of its participation in engine programs over the entire lifecycle depends to a large extent on this business. MTU's commercial business is cyclical and sensitive to demand for air transport as well as to the financial situation of the commercial aviation industry.

MTU's customers in the military engine business are national and international agencies. Therefore, political changes have an almost immediate effect on MTU. Given the tight national budgets that can be observed at present, especially in Europe, there is always the risk that countries may postpone or cancel orders. Due to the budget situation, it may be necessary to renegotiate the scope of contractually agreed deliveries. In the military engine business, MTU is firmly embedded in international cooperative ventures. This tends to limit risks because the partners work together to protect their common interests. Furthermore, the terms of existing contracts in the military sector are generally defined to cover a prolonged period of time, thus largely ruling out price risks.

Even though the company assumes that defense budgets are likely to rise in the future, MTU's military business is principally dependent on the sustained commitment of the German and other European governments and the U.S. administration to their military procurement programs.

MTU is also exposed to competition in its MRO segment, which comprises commercial maintenance, repairs and overhauls. MTU is an independent provider of MRO services and therefore competes with airlines' internal MRO service providers, which have links to many of their potential customers. MTU's other major competitors are OEMs' maintenance operations. OEMs can link their service contracts with airlines to the sale of engines, which initially gives them a competitive advantage over MTU in this field. Worldwide, there are also many independent engine maintenance shops that, like MTU, are endeavoring to expand their market position.

In the present geopolitical and macroeconomic conditions, the commercial maintenance market is still affected by different speeds of recovery. The narrowbody business is recovering far faster than the widebody business and large domestic markets such as China, the USA, India are leading the way in the revival of regional traffic.

Furthermore, it is evident that scheduled engine overhauls are being postponed (e.g., for engines with a remaining lifecycle) or are heavily budget-driven, e.g., to avoid expenditure by undertaking short-term optimization with lower MRO requirements.

During the Covid-19 pandemic, global cargo business performed strongly and MTU was able to further increase its MRO market position with the CF6-80, PW2000 and GE90-115 engine types.

Conditions are tough in some areas of the commercial MRO market in which MTU operates. The market conditions may remain challenging in the future as a result of factors that the company is unable to influence. The following factors could prove detrimental to the success of MTU's MRO business.

- In view of the prevailing overcapacity of MRO service providers, MTU is exposed to intensive price competition. This could have a negative impact on profit margins in this operating segment.
- Demand for MRO services depends on the capacity utilization of aircraft and could decline significantly if there is a reduction in passenger traffic.
- The client base in the MRO segment is characterized by a few large individual customers, so losing one of these customers could have a negative impact on revenue from this business.
- Some of the engine programs in the MRO business are at an advanced stage in their lifecycle, so the MRO product portfolio could be too strongly focused on aging products and technologies.
- OEMs strive, and could continue to strive, to negotiate agreements where a large proportion of maintenance work is performed by internal units, especially because some of these units have links to their potential customers. A considerable shift towards such in-house units would reduce the competitive opportunities for third-party suppliers such as MTU.
- MTU is a contracting party in “fly by the hour” and “power by the hour” agreements which obligate it to perform maintenance work on engines at flat-rate, usage-based prices. Furthermore, under these agreements, MTU effectively assumes the risk of higher maintenance and overhaul costs. MTU may incur losses in connection with these agreements because the underlying price models require a complex analysis of the performance conditions (including assumptions on future engine use and shop visit rates) when submitting offers for long-term agreements. If the assumptions made by MTU prove incorrect, its margins could be negatively affected.

MTU does not currently see any market and program risks that could jeopardize its status as a going concern.

Dependence on cooperation

(Program/project risks, governance risks, information/decision-making risks, competitive/market risks)
MTU has long-term cooperation and collaboration agreements with various OEMs and other market participants. These can be terminated at short notice in certain circumstances, e.g., if there is a change in the company's shareholder structure. All these scenarios are beyond the company's influence. The loss of a major customer could have a severely negative impact on MTU's business activities, financial position or results of operations. For information on customer cluster risks, please refer to the *"Segment report"* in the *Notes to the consolidated financial statements.*

In its commercial business, MTU is involved in a number of risk and revenue-sharing contracts (RRSP contracts) with OEMs, which relate to the development, production, sale and, in some cases, maintenance of commercial aircraft engines. The OEMs with which MTU has RRSP contracts include Pratt & Whitney, GE Aerospace, IAE LLC and IAE AG. Through RRSP contracts, MTU participates in the development and production of new engine programs. In return, MTU is entitled to a share of the revenues from the sale of engines, components and spare parts.

RRSP contracts are an important business base for MTU. They enable it to build up long-term relationships with OEMs and to participate in the major engine manufacturers' sector-leading engine programs. Furthermore, MTU's RRSP contracts entail considerable risks, including a lack of control over the activities covered and losses arising from pricing of program activities or upfront financing of design and development costs, cost overruns, guarantees, warranties and penalties. The following overview highlights these risks:

- The respective OEM controls the end-customer relationship throughout the entire term of the program, including setting the price of engines and spare parts, granting concessions (including financing of engine and aircraft sales in a manner that could ultimately include recourse to MTU through the RRSP contract), granting guarantees, and defining and amending guarantee and other service guidelines for the aftermarket business.
- The RRSPs give MTU only limited inspection rights. As a result, it is not in a position to fully monitor whether the OEMs fully meet their obligations or exercise their rights fairly.
- OEMs can perform repair processes on MTU components or work with second-hand spare parts, which would have a negative effect on MTU's sales of spare parts.
- MTU has to undertake considerable advance work for the design and development of the engine components, for which it has been allocated design and development responsibility. This upfront work has to be performed before a single engine has been sold. Therefore, future revenue from the engine program is not certain.
- Similarly, MTU may be required to make advance payments ("entry fees") to OEMs to enable it to participate in programs, as compensation for development or other work already undertaken by the OEMs.
- Aircraft manufacturers may require OEMs to make advance payments for participation in new aircraft programs and to cover a percentage of the manufacturer's R&D expenses. The OEMs generally pass some of the costs for such payments on to their RRSP partners.
- The value of MTU's contribution to RRSPs (in the form of work on the design, development and production of engine modules and components) is generally set on the basis of cost assumptions made when the contract is signed (with limited adjustments for changes in design or extraordinary changes in raw material costs). In the event of cost overruns in the development and production of parts for which MTU is responsible, MTU may therefore not be able to recoup such costs from its share of the program. As a result, its profits from the engine program could be reduced.

In the commercial maintenance business, MTU's interests in the Asian market include a 50:50 joint venture, MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China. MTU is also involved in engine leasing, maintenance and development. In this way it can respond to the new structures in the aftermarket and offer customers a full range of services. In jointly controlled entities, where decisions have to be made collectively, there is always a risk of differences of opinion. Similarly, participation in international joint ventures often reveals cultural and political differences (for instance payment morale). Moreover, changes in the geopolitical situation can adversely affect cooperation in joint ventures.

From today's standpoint, MTU believes its collaborative business model stands it in good stead to effectively manage market and program risks, in particular in respect of the challenges associated with the development, production and market introduction of new engine programs and architectures. MTU therefore does not expect these market and program risks or its dependency on cooperative agreements to have any significant impact on the Group's continued existence as a going concern.

Development and manufacturing risks

Research and development risk

(Development/technology risks)
MTU's success depends, among other things, on its R&D activities, which are performed principally in the OEM segment. MTU finances its R&D spending from its own funds, state funding and, to a limited extent, through corresponding orders. There is a risk that R&D activities may not meet customers' or market requirements cost-effectively or on schedule. Therefore, the company cannot give any assurance that the capital used for these R&D activities will lead to opportunities for commercialization or result in productivity improvements commensurate with the resources invested. Furthermore, MTU is developing specific technologies and capabilities for new programs focused on improving the overall efficiency of engines in order to reduce fuel consumption and emissions. If one of these programs should be halted or only be continued with a considerable delay, there is a possibility that MTU might not recoup the R&D costs and related investment expenditures incurred in the expectation of such programs.

Some of MTU's development activities are carried out within the scope of cooperative ventures. Each stake in such ventures and in RRSPs spreads the R&D-related risks beyond the company and therefore reduces its control over them. If one of MTU's cooperation partners has development and production risks, these could have a significant negative economic effect on MTU. In connection with RRSP and similar agreements, MTU's potential inability to deliver the necessary technology or design contribution could result in additional costs in order to fulfill its obligations, or MTU could be forced to make considerable compensation payments under the RRSP agreement instead of the technology or design contribution. In addition, MTU may be required to make penalty payments to its RRSP partners if it fails to meet delivery schedules or certain development targets.

Extensive professional project management and risk diversification between the development partners reduce the risks, so in this context MTU does not see any risks to its status as a going concern.

Manufacturing risks/shop floor risks

(Production/maintenance risks, program/project risks)
Highly sophisticated components and new materials are needed to meet the requirements of OEMs and other consortium partners with respect to engine weight, fuel consumption and noise emissions. In order to efficiently produce and process such components, MTU develops – and gains official approval for – innovative new manufacturing techniques. This can lead to delays in the start of production, a temporary increase in unit costs or a temporary reduction in delivery volumes compared to the agreed level. A further risk is that customers might impose penalties in the event that deliveries are delayed. It could also happen that the new manufacturing processes are not yet sufficiently mature to fully meet requirements when volume production is due to start. MTU counters this risk in technology projects by providing systematic support for the development and implementation process.

At present, MTU does not see any risks in this context that could jeopardize its status as a going concern.

Procurement and purchasing risks

(Procurement risks)
MTU sources individual parts and components, finished products, specific services and raw materials from suppliers and third-party vendors. MTU is exposed to a risk of inadequate availability of such products. Disruption can be caused by factors such as cross-border supply chain problems, as caused most recently by the effects of the Covid-19 pandemic and the geopolitical situation (e.g., the Russia-Ukraine conflict), technical problems, bottlenecks in production capacity, and crisis-related hikes in the price of raw materials. Given the structure of the RRSP agreements with its partners, MTU is only able to pass unexpected cost increases on to partners and customers to a limited extent in individual cases. Therefore, MTU takes the extensive measures outlined below to minimize the risks insofar as possible. MTU plans production requirements at regular intervals in close consultation with the supply chain to avoid unexpected procurement bottlenecks. Wherever it makes sense, products are validated and sourced from several suppliers. To limit inflation insofar as possible, there are multi-year supply contracts for many products. Regular supplier risk assessments, established purchasing and procurement processes, and close relationships with suppliers also help to minimize purchasing and procurement risks.

At present, MTU does not see any risks in this context that could jeopardize its status as a going concern.

Liability risks

(Program/project risks, business environment risks, compliance risks, governance risks)
Product liability claims, including defects in products produced by cooperation partners, and insurance costs could adversely affect MTU's financial position.

MTU operates in markets where its products and services could expose it to liability for personal injury, death or property damage. Liability could arise, in particular, due to failure of an engine or aircraft component designed, developed, manufactured, supplied or installed by MTU or one of its RRSP partners, in both the new engines business and the spare parts and aftermarket business.

In the military engine business, MTU is largely exempt from product risk liability. In the commercial business, however, MTU is party to consortia and RRSP contracts. In most of these relationships, liability for third-party claims is borne by the consortium or the partners on the basis of their respective contribution to the consortium or RRSP, irrespective of the fault of the individual partner. Therefore, product liability claims could also include claims due to defects relating to products that are not manufactured by MTU and services not rendered by the company. In these RRSP programs, the consortium lead generally has the right to settle third-party claims unilaterally on behalf of all program participants. Consequently, MTU may be exposed to substantive liability for defects unrelated to the performance of its products. Furthermore, MTU may have limited ability to negotiate compensation in individual cases. At the same time, the joint liability of engine program consortia constitutes effective transfer of the risk of defects that are attributable to MTU.

Most of MTU's RRSP contracts require it to take out insurance to cover the potential liabilities arising from such agreements and MTU makes participation in these programs contingent on such agreements. To cover the above risks, MTU has aviation product liability insurance with international aviation insurers (minimum rating of A– from Standard & Poor's or A.M. Best). Overall, such insurance covers the liability risks discussed here within the value and content of such coverage. These limits could be exceeded within RRSP contracts, e.g., by contractual penalties for delays resulting from performance defects.

At present, MTU does not see any risks in this context that could jeopardize its status as a going concern.

Risks relating to financial instruments

Foreign currency risks

(Financial risks)
More than 80% of MTU's revenue is generated in U.S. dollars. A large proportion of expenses is likewise invoiced in U.S. dollars, thus providing a natural hedge. Most other expenses are incurred in euros and, to a lesser extent, in Polish zloty, Chinese renminbi, Serbian dinar and Canadian dollars. In line with the corporate policy of generating profit solely on the basis of operating activities and not through currency speculation, MTU makes use of hedging instruments exclusively for the purpose of controlling and minimizing the effect of U.S. dollar exchange rate volatility on (adjusted) EBIT.

The forward foreign exchange contracts concluded by MTU cover a large part of its net exposure to short- and mid-term currency risks. The hedging horizon is up to five years and uses a model where the authorized hedging ratios decline the further in the future the net currency exposure is. Thus, only a small portion of the forecast net U.S. dollar exposure in the present and following year is exposed to currency risks relative to the Group's function currency (the euro).

As of December 31, 2022, MTU held a hedging portfolio comprising forward foreign exchange contracts totaling U.S.$3,000 million (translated at the rate on the reporting date: €2,813 million), with maturities up to 2026.

Detailed information on the financial instruments used to hedge future cash flows is provided in *Section IV. Note 35 "Financial risk"* in the Notes to the consolidated financial statements.

In view of this hedging strategy, MTU considers its foreign currency risks to be manageable.

For a detailed description of MTU's financial management system, please refer to the *"Principles and objectives of financial management"* section under "Financial situation."

Non-payment risk

Financial risks, country risks, business environment risks)
Airlines, which were badly affected by the pandemic and the geopolitical and macroeconomic situation, are major direct and indirect customers of MTU. These companies may find themselves facing financial difficulties that affect the receivables of MTU and its partners.

Due to the pandemic, global airline customers amassed considerable losses in 2020 and 2021 (according to IATA, U.S.$138 billion in 2020 and U.S.$52 billion in 2021). Although the situation improved in 2022 in line with the development of the pandemic, the macroeconomic context nevertheless has to be taken into consideration. For MTU, such factors could result in defaults on payments for work and services performed, especially in the commercial aftermarket business.

The consortium leaders in the commercial OEM business have intensive receivables management systems in place. Despite the crises, the credit default risks in the commercial OEM business are still considered to be manageable due to the structures established by the programs and long-standing experience. In the MRO business, the responsible account managers use established and proven concepts to proactively monitor and manage credit risks in short cycles. A risk assessment is carried out before any relevant contract is signed, and systematic compensatory precautions are taken as needed. These include commercial credit insurance, export credit guarantees (Hermes coverage) and the structure of payment terms (prepayments). All in all, MTU continues to consider the risks of non-payment to be manageable, especially in light of the measures taken to control them.

Other risks arising from business operations

Compliance risks

(Compliance risks, governance risks)
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 can arise in all areas of the company.

MTU has implemented a number of measures with regard to its organizational structures and processes to minimize these risks and to safeguard compliance. In particular, central functions with managerial authority have been set up to monitor and enforce compliance with laws and regulations in the individual divisions (for instance, the Quality division is responsible for compliance with aviation authority regulations, while the Environmental Protection/Occupational Health and Safety division ensures that environmental protection regulations are adhered to).

Above and beyond that, measures have been put in place at the company level to minimize the risks associated with compliance issues:

/ binding rules of conduct valid throughout the Group,
/ establishment of a central contact for reports of misconduct,
/ designation of a Compliance Officer,
/ continuous security checks on employees,
/ regular training.

Criminal intent can never completely be ruled out. All in all, MTU considers the compliance risks to be manageable, especially given the measures taken to control them and the management's oversight and regular assessment of their appropriateness and effectiveness.

Environmental risks and climate change

Environmental risks

(Environmental risks, communication risks)
Plants and installations at MTU's sites are subject to local environmental and occupational safety laws and regulations. To prevent or minimize pollution, official operating permits or licenses have to be obtained. In this context, operating concepts are required. Investments and operating expenditures are designed to ensure compliance with the laws and regulations and oversight of their appropriateness and effectiveness is systematically supported by establishing corresponding risk management and internal control systems. Nevertheless, MTU cannot completely preclude individual breaches of the applicable laws and regulations and failure to comply with their at times dynamic development and interpretation. Consequently, there is a risk that considerable fines or penalties could be imposed, including criminal sanctions. In addition, permits or licenses might be revoked or not extended in the future.

Under specific legal judgments, owners and operators of contaminated sites may be held liable for the costs of investigation and remediation, irrespective whether or not the contamination was caused by them. Some MTU facilities have a long history of industrial operations by MTU or third parties. In individual cases, newly discovered contamination at MTU's facilities or third-party sites could result in a risk that MTU could be exposed to claims in excess of the known obligations. Further information on occupational safety and environmental protection can be found in the *"Non-financial statement"*. All in all, MTU considers the environmental risks to be manageable, especially in light of the measures taken to control them.

Climate change

(Business environment risks, environmental risks, compliance risks, communication risks)
When setting its own targets, MTU is guided by the EU Green Deal, which is derived from the 1.5°C target of the Paris Agreement and aims for climate neutrality by 2050. The main areas of activity are the transition to climate-neutral aviation and the shift to climate-neutral provision of the products and services. Alongside the relevant societal risks, there is a specific threat to MTU's business due to the loss of market access and growth opportunities, a deterioration in earnings as a result of legally-induced sanction mechanisms, a loss of attractiveness as an employer for present and future generations, and greater difficulty accessing funding, up to including legal requirements to halt production of parts or the entire business operation.

Goals and opportunities geared to sustainable commercial propulsion concepts as part of the transition to emission-free flying are defined in MTU's Clean Air Engine Technology Agenda Claire. This is being implemented as part of MTU's Leading Technology Roadmap, which focuses on two areas: First, the evolutionary development of gas turbines based on the GTF, combined with revolutionary propulsion concepts that greatly improve the cyclic process and significantly reduce all emissions. Second, complete electrification of the powerchain to maximize emission-free flying. Out of all the concepts considered, from MTU's current standpoint the conversion of hydrogen into power with the aid of a fuel cell is becoming most relevant. MTU refers to this as the "flying fuel cell." Alongside these topics, MTU is actively supporting developments to increase the use of sustainable aviation fuel (SAF). Information on alternative propulsion technologies for aircraft is presented in the sections entitled *"Substitution risks arising from disruptive technologies" in the risk report and „Research and development," and in the "Non-financial statement."*

The measures designed to achieve climate-neutral provision of MTU's products and services are set out in the ecoRoadmap, which MTU has been rolling out stepwise since 2020. MTU continuously monitors greenhouse gas emissions in the production and maintenance of engines and modules at its sites using the recognized international Greenhouse Gas (GHG) Protocol. MTU aims to permanently reduce CO_2 emissions or provide high-quality compensation for those emissions are unavoidable. To make the climate impact of MTU even more transparent for stakeholders, the company takes part in the annual rating by the international non-profit organization CDP, which collects data on greenhouse gas emissions, climate risks, and climate strategies from companies once a year. All in all, MTU considers the climate change risks to be manageable, especially in light of the measures taken to control them.

IT risks

(IT risks, communication risks)
MTU constantly monitors its risk situation in the area of data processing. The two risks considered to be most critical in this field are system crashes due to technical faults and cyberattacks, resulting in the non-availability of systems, unauthorized disclosure of information, or permanent loss of data. In view of the advanced digitalization of all material business processes at MTU, high availability and integrity of IT systems are crucial for smooth business operation. MTU generates, stores and processes extensive data with special confidentiality requirements – not only, but in particular, in the military business.

MTU constantly invests considerable sums in technical and organizational measures to guarantee the availability, confidentiality and integrity of the IT systems used or operated by the company. Nevertheless, it cannot be ruled out that MTU will be confronted with system failures, unauthorized access to confidential information or the loss of data. Every data theft, unauthorized data manipulation or data loss could negatively affect MTU's relationship to present or potential customers. Incidents like this could expose MTU to liability claims by third parties. All in all, MTU considers the IT risks to be manageable, especially in light of the measures taken to control them.

Personnel risks

(Personnel/human resource risks, communication risks)
The quality of MTU's products and services depends to a large extent on the personnel it can recruit and retain, especially engineers and other specialists. MTU seeks to access both young talent and experienced specialists through company training programs, dual-study programs (which combine practical and academic work), attractive working conditions and marketing activities. However, for many key positions within the MTU Group there only a few sources of new staff with the necessary qualifications. The competition for such employees has increased in recent years and could intensify further in the future. Moreover, it is expected that demographic change will greatly exacerbate the shortage of skilled workers and adversely affect the ability to maintain or increase the personnel capacity required for business operations.

In addition to the risk that the MTU might not be able to recruit enough skilled workers, there is a risk of losing staff to other companies. The company is of the opinion that some MTU employees have technological know-how that makes them attractive to competitors or other employers. MTU's success depends on its ability, not simply to employ technically skilled specialists, but also to retain them over the long term, motivate them and support their personal and professional development.

Failure to recruit, retain and drive forward the development of qualified employees could impair MTU's ability to realize its planned business performance.

All in all, MTU considers the human resources risks to be manageable, especially in light of the measures taken to control them.

Risks arising from general, customs and tax legislation

(Compliance risks, governance risks, country risks, business environment risks)
Complex and in some cases conflicting international foreign trade and tax regulations, especially with regard to cross-border trade in goods and services in the industrial and defense sectors, mean that MTU is particularly exposed to violation of legal provisions. To compensate for relevant legal risks, processes that reinforce control are monitored and driven forward by central functions with technical and managerial authority. Identifiable risks arising from pending tax audits, customs audits, export controls and legal proceedings are managed by the central departments with the support of independent external consultants. The focus lies in particular on targeting process weaknesses and compensating for them. All in all, MTU considers the risks arising from general, customs, export control and tax legislation to be manageable, especially in light of the measures taken to control them.

Overall assessment of MTU's risk exposure

Risks in each of the key areas of exposure described above are monitored and continuously evaluated through a risk assessment for the coming fiscal year on the basis of their probability of occurrence and quantified as a deviation relative to the currently applicable operational planning figures. In MTU's risk management process, risks are assigned to one of four probability levels. Based on quantifiable risks (>€5 million) evaluated in the risk management process, for fiscal 2023, MTU derives risk-based earnings exposure based on experience of around €85 million. The OEM segment accounts for around €65 million of this and the MRO segment for the remainder. In addition to the earnings impact, the liquidity impact of the risks is identified, monitored and addressed through the risk management process. In 2023, the identified risk factors could reduce liquidity by approximately €180 million. However, this would be covered by available cash and cash equivalents and by credit lines that have not been drawn down. €131 million of this amount relates to the OEM segment.

Both segments' risk exposure principally comprises market and program risks. In the OEM segment, the market and program risks relate to risk-and-revenue-sharing contracts with OEM partners and include the risk of adverse effects from the development of the business if capacities and the supply of parts required to meet higher maintenance requirements for the GTF fleet cannot be increased sufficiently fast. Similarly, there is uncertainty regarding the export of military equipment. In the MRO segment, further demand effects in connection with the forecast market recovery have to be taken into account as further risk drivers. The estimated impact of the ongoing Covid-19 pandemic on business development in 2023 has been taken into consideration in the segment planning.

Apart from the risks quantified above, MTU monitors and manages further risks associated with development, production, maintenance and procurement that were not quantifiable as of the reporting date. At present, the Executive Board does not see any risks that could jeopardize MTU's status as a going concern. All in all, the Executive Board considers the risk situation to be manageable, especially in light of the risk management system and the measures taken to control the risks.

Opportunity report

The integrated opportunity and risk management system is embedded in the value-oriented management of the Group and its organizational structures and is based on the leading international standard, the COSO II Enterprise Risk Management Framework.

Market and program opportunities

Basic research and ongoing development of engine technologies, followed by their deployment in end products, have made MTU one of the world's leading manufacturers of engine components. MTU's new products lead the field in terms of efficiency because they save fuel and reduce emissions, noise and costs. MTU has achieved market success with the Pratt & Whitney GTF™ engine family, which it develops in partnership with Pratt & Whitney. The A320neo, Airbus A220 and Embraer E190-E2 with GTF engines are already being used successfully in scheduled service. Since 2018, the PW800 engine family, developed in cooperation with Pratt & Whitney Canada, which is based on the same core engine as the GTF, has powered premium manufacturer Gulfstream's new generation of business jets. In order to balance out its engine portfolio in the long-haul segment, MTU has participated in the development of the GE9X, which will be the sole engine for the Boeing 777X. Thanks to this balanced portfolio, MTU expects to benefit in the decades ahead from the predicted growth in all present market segments: the regional jet, narrowbody and widebody segments. The expected growth relates to both commercial series and new components business and the spare parts and aftermarket business, which should benefit, in particular, from the business performance of the V2500 engine programs and successively from the GTF program family.

Among its customers in the military sector, MTU has established a reputation as a highly qualified partner with comprehensive system know-how in product development, manufacturing and maintenance. In particular by driving forward its military-engine maintenance services with the German air force, MTU sees chances to strengthen its ties with Germany's armed forces.

In addition, the official start of the FCAS program in the reporting period and additional new components and aftermarket business – especially for the EJ200 engine for the Eurofighter and the TP400-D6 for the A400M military transporter – open up further business opportunities with national and international customers. These will doubtless receive a further boost from the increase in international defense budgets resulting from the geopolitical developments in the reporting period.

Driven in particular by the T408 engine, the military-program partnership with GE Aerospace could generate further opportunities to participate in transatlantic programs in the future.

The development of the maintenance business in the aviation industry, in which MRO services are increasingly being offered together with engine sales contracts, gives MTU the opportunity, as a consortium partner, to develop customer loyalty in the commercial maintenance segment and soften the impact of risks associated with the spare parts market. This integrated approach to MRO enables program partners to become members of an MRO network, giving them access to the entire volume of

MRO work associated with an engine series, in accordance with their share in the program. There is a variety of models for participating. For instance, partners in the MRO network might only perform repairs on their own components, or be allocated a quota of complete shop visits corresponding to their program share. Membership in an MRO network offers more moderate margins than operating as an independent MRO provider.

The independent MRO market for engines such as the GE90 and V2500 continues to offer long-term prospects for MRO providers to participate in this steadily growing market. In particular, the increase in the number of aircraft no longer tied to the OEMs offers independent MRO providers like MTU the opportunity to gain new customers and to assume responsibility for managing the maintenance of large fleets.

Continued investment in automation and the focused increase in maintenance capacity, for instance through the establishment of MTU Maintenance Serbia d. o. o. and EME Aero Sp. z. o. o., will enable MTU to meet the high demand in both the OEM and MRO segments cost-effectively in the long term.

Through MTU Maintenance Lease Services B. V., Amsterdam, Netherlands, MS Engine Leasing LLC, Rocky Hill, CT, USA, and the partner companies in the PW1100G-JM MRO network, MTU aims to extend its activities in the lucrative leasing business and increase the scope of services provided in the aftermarket.

Research and development opportunities

The risk report describes the risks associated with research and development and manufacturing, but MTU's ongoing technology and development activities also open up new business opportunities. For example, ongoing development of products and the related manufacturing technologies and, in particular, intensive involvement in developing innovative propulsion concepts in collaboration with industrial, public-sector and scientific partners, pave the way for MTU to secure a position as a strategic partner in future engine programs. This could help ensure a balanced portfolio of engines and new propulsion concepts at different life cycle phases both in the series and new components business and in the spare parts and aftermarket business. Attention should be drawn to MTU's participation in the FCAS program in the reporting period as this can be regarded as an important driver of the ongoing development MTU's technological expertise for the aviation sector.

The risk report refers to the challenges involved in ramping up new or relatively new programs; here too, the challenges can be transformed into opportunities. Production processes and systems can be optimized, for example through the use of digital twins, predictive simulation (ICM2E), process data management and the forecasts derived from this, and new, cutting-edge manufacturing technologies and processes can be introduced. The risk analyses undertaken to secure the ramp-up of production, backed up by the MRL process and design or process FMEA, result in timely identification of potential problems and the related lasting process improvements. The effects of these improvements are not only felt in new programs; they can also be transposed to existing ones. That leads, for example, to further cost reductions and enhanced delivery reliability. The spread of additive manufacturing techniques (3D printing of components) opens up new possibilities for application-optimized component design and cost benefits in their production.

Through continuous improvements towards operational excellence, methods, processes and leadership behavior are constantly being developed as part of Lean Management@MTU. This results in increased transparency, a focus on value creation, support in achieving ambitious targets, and faster and more sustainable problem-solving and approaches to improvement. Improved preventive approaches, a faster response to deviations from plan and sustainable and structured solutions to problems enable the company to put in place stable processes and optimize resource deployment. For further information, please refer to the section headed *"Research and development."*

Other opportunities

As a large part of the company's revenue comes from contracts invoiced in U.S. dollars, especially in the commercial new engines and series business (OEM) and the commercial spare parts and aftermarket business (OEM, MRO), a strengthening of the U.S. dollar against the euro would improve MTU's earnings. If there is a stabilization or short-term drop in inflation, especially in the areas of energy and raw material prices, this would have a positive effect on MTU's cost structure and hence on its business results.

See the *Risk report* for information on how the opportunities identified can be exploited and the associated risks avoided.

Overall assessment of opportunities

Analogously to the risk situation, as of December 31, 2022, there had not been any significant change in the opportunities compared with the previous year. It is conceivable that business could develop more favorably than is anticipated in the outlook for the 2023 fiscal year as a result of a more rapid market recovery. MTU has taken all the organizational measures necessary to recognize potential opportunities in good time and respond to them adequately. MTU applies the same methods in its assessment of specific opportunities as it does when evaluating risks. As a conservative approach is taken to the identification of risks and opportunities, the opportunities are necessarily low compared with the risks.

Based on the opportunities identified, MTU anticipates that the market and program-related earnings opportunities in 2023 are around €33 million, with the OEM accounting for €30 million of this. The liquidity-related opportunities amount to €50 million, with €45 million of this attributable to the OEM segment. Opportunities to extend MTU's range of products and services may initially lead to a financial burden. In view of the long cycles involved in the business model, these will only generate positive earnings in subsequent fiscal years. MTU does not currently foresee any fundamental changes in its opportunities.

Main features of the internal control and risk management system

Internal control and risk management system

MTU understands an Internal Control System (ICS) to be the principles, procedures and measures introduced at the company by its management that are aimed at the organizational implementation of management decisions.

The risk management system (RMS) is a continuous and systematic process that has to be applied uniformly throughout the Group to ensure early identification, evaluation, management, monitoring and reporting of risks. The overriding objective is to safeguard the existence of the company and its future success.

The ICS and RMS are based on the globally recognized and established framework of the Committee of Sponsoring Organizations of the Treadway Commission (COSO I) and the applicable requirements and basic elements of the audit standards issued by the German Institute of Public Auditors (IDW PS 981 and 982).

The Executive Board of MTU bears overall responsibility for establishing the ICS and RMS. They are aligned to the business model and specific requirements of the MTU Group and are an important element in its comprehensive approach to corporate governance. This comprises a framework for creating sustainable value for shareholders, customers, employees and society.

All MTU entities are included in the ICS and RMS. The local management of each entity is responsible for realizing an appropriate and effective ICS and RMS, based on the Group-wide requirements, and is supported in this by the central divisions.

The Risk Management Board, which is comprised of MTU's highest risk manager and selected heads of various functional areas, is an overarching decision-making body that examines aspects of risk management, discusses and takes decisions on reported risks or those that have to be reported to the Executive Board, and oversees the functioning of the risk management system.

MTU's internal audit function, which is process-independent, plays an important role in checking the effectiveness of, and improving, the ICS and RMS. It regularly assesses, and helps to enhance, the controlling and monitoring systems. It is also considered to have an advisory function, contributing to improving business processes and, ultimately, the effectiveness of the ICS. The rules of procedure of the internal audit function comply with national and international requirements as laid down by the Deutsches Institut für Interne Revision and the Institute of Internal Auditors. The internal audit function is also bound by the code of professional ethics. The administrative standards of the internal audit function are accessible to all employees on MTU's intranet.

The Executive Board regularly assess the ICS and RMS at the end of each fiscal year. In 2022, this assessment was based on the analyses and audits performed by the relevant units, Internal Audit and external consultants during the reporting period. The findings were discussed in detail at meetings of the Executive Board and the Audit Committee and measures were introduced for continuous optimization, especially to harmonize the documentation. Based on this, the Executive Board did not identify any indication that the ICS or RMS was inappropriate or ineffective as of December 31, 2022.

The Audit Committee of the Supervisory Board discusses risk management and the audits by the internal audit function. In accordance with Section 107 (3) of the German Stock Corporation Act (AktG), as amended by the German Accounting Law Modernization Act (BilMoG), it is responsible for monitoring the effectiveness of the RMS, the ICS, the internal auditing systems, the financial reporting process and the audit of the financial statements.

Compliance Management System

The ICS and RMS also include a compliance management system (CMS), which is aligned to the company's risk situation.

MTU's compliance management system is based on the requirements of the IDW AsS 980 assurance standard published by the Institute of Public Auditors in Germany and the Good Practice Guidance on Internal Controls, Ethics, and Compliance issued by the Organisation for Economic Co-operation and Development (OECD).

As the highest decision-making authority, the CEO bears the responsibility for the company's business ethics and anti-corruption policy. The central functions responsible for ensuring compliance are a Group-wide Compliance Officer and the Compliance Board.

MTU has implemented a number of measures with regard to its organizational structures and processes to minimize these risks and to safeguard compliance. In particular, central offices with managerial authority have been set up to monitor and enforce compliance with laws and regulations in the individual divisions (for instance, the Quality division is responsible for compliance with aviation authority regulations, while the Environmental Protection/Occupational Health and Safety division ensures that environmental protection regulations are adhered to). Above and beyond that, measures have been put in place at the company level to minimize the risks associated with compliance issues:

The corporate culture at MTU is characterized by trust and mutual respect. The observance of legal and ethical rules and principles plays a central role in this respect. They are defined in a Code of Conduct, which embodies MTU's corporate culture and reflects its resolve to comply strictly with the relevant laws and internal regulations. It is a Group-wide guide to ethical business relations.

The Compliance Officer submits quarterly reports to the Executive Board and the Supervisory Board's Audit Committee, which in turn reports to the plenary meetings of the Supervisory Board. The Supervisory Board's Audit Committee oversees the Executive Board's compliance activities. The company has established a global whistleblower system that allows employees and external stakeholders to report suspected cases of misconduct confidentially to the Compliance Officer.

MTU strives to continuously develop its compliance system. That includes raising employees' awareness of compliance-related matters.

Description of the principal features of the accounting-related ICS and RMS

The current recommendations of German Accounting Standard (GAS) 20 have been applied in this section of the combined management report concerning the main features of the accounting-related internal control and risk management system.

Objectives and components

MTU's Executive Board, Supervisory Board and Audit Committee attach the greatest importance to ensuring the regularity, accuracy and reliability of MTU's financial reporting. The accounting-related internal control and risk management system applicable for the MTU Group's financial statements helps ensure systematic compliance with these internal and external accounting requirements.

/ The accounting-related risk management system (RMS) is an integral part of the Group's company-wide risk management system. It forms the basis for the uniform and appropriate handling of risks and for communicating them within the Group. The risks inherent in the Group's financial reporting are among the corporate risks to be monitored as a whole.

/ The design of the accounting-related internal control system (ICS) at MTU meets the requirements of the German Accounting Law Modernization Act (BilMoG), the definition provided by the Institute of Public Auditors in Germany (Institut der Wirtschaftsprüfer e.V. – IDW), the internationally recognized and established framework of the Committee of Sponsoring Organizations of the Treadway Commission (COSO I), and the features specific to MTU. MTU understands an ICS to be the principles, procedures and measures introduced at the company by its management that are aimed at the organizational implementation of management decisions:
  - to safeguard the effectiveness and economic efficiency of business operations – which includes protecting the company's assets,
  - to ensure the regularity and reliability of internal and external accounting, and
  - to comply with statutory regulations relevant to the company.

Main features

/ MTU has a clearly defined management and corporate structure. Key cross-organizational functions are coordinated centrally by the Group accounting department. At the same time, the subsidiaries have sufficient independence and are responsible for financial reporting.

/ Appropriate guidelines (e.g., accounting principles / financial reporting guidelines) are in place and are updated as required. The Group accounting department is the central point of contact for questions on financial reporting at Group level or at individual subsidiaries and joint ventures and has the right to issue instructions within its area of responsibility.

/ Preparation and quality assurance for the financial data communicated by the Group companies for inclusion in the consolidated financial statements are undertaken on a decentralized basis by the respective finance departments on the basis of the Group-wide reporting guidelines.

/ As a supplementary control measure, (plausibility) and quality control checks on the reported data are carried out by the Group accounting department and during the consolidation process for the consolidated financial statements.

/ To safeguard and enhance the integrity and responsibility of all employees, including with respect to financial reporting, all employees are required to give an undertaking that they will observe the Group-wide Code of Conduct and the applicable internal regulations (e.g., the financial reporting guidelines).

/ The (professional) qualifications of staff employed in the finance function are regarded as important for the quality of the Group's accounting process and are monitored and driven forward by the management team. The departments and other organizational units involved in the accounting process are suitably equipped and regularly trained both in quantitative and qualitative terms. In this context, the structure and workflows are regularly reviewed with the support of external consultants and by comparison with peer group companies.

- The IT systems are protected against unauthorized access by appropriate installations. As far as possible, standard software is for financial reporting. The accounting-related IT systems and processes (e.g., IT general controls) undergo regular internal and external reviews based on an extensive concept.
- Appropriate and effective risk-mitigating controls have been identified and realized accounting-related processes. Examples are standardized reporting formats, IT controls, systematic checks on forecast financial information, an LoA approval concept for quality assurance of book-keeping and financial reporting information.
- The consolidated financial statements and all significant financial data submitted by Group companies for inclusion in the consolidated financial statements are audited annually by the Group's external auditor. The same auditor also reviews the condensed consolidated financial statements and interim Group management report in the half-year financial report. This is supplemented by an external audit or assurance review of the separate financial statements compiled by the material Group companies.
- The financial reporting and accounting-related ICS and RMS are regularly audited by the internal audit department. In addition, they are overseen by the Audit Committee.
- The sustainability-related information for the management report, especially the non-financial statement, are compiled and reviewed on a decentralized basis by the responsible departments at MTU's locations in accordance with the applicable Group-wide guidelines. Supplementary (plausibility) checks and other quality assurance processes are performed on the reporting data and their aggregation or consolidation by a central CR organization, which is overseen by an interdisciplinary CR Board.
- For extended, independent quality assurance of the sustainability-related information in the management report, especially the non-financial statement, a (limited assurance) review is performed by the external auditor.

Disclosures under takeover law

The following disclosures are made pursuant to Section 315a of the German Commercial Code (HGB) (takeover directive implementation). Items included in Section 315a of the German Commercial Code (HGB) that are not met at MTU Aero Engines AG are not mentioned here.

Composition of subscribed capital

The company's subscribed capital (capital stock) amounts to €53,453,112 and is divided into 53,453,112 registered non-par-value shares. The shares are registered shares. All shares have equal rights and each share entitles the holder to one vote at the Annual General Meeting.

Restrictions on voting rights and the transfer of share ownership

As of December 31, 2022, MTU held 64,262 treasury shares (previous year: 80,088). No voting rights are exercised in respect of treasury shares. The articles of association of MTU Aero Engines AG do not contain any restrictions on voting rights or the transfer of share ownership. The Executive Board has no knowledge of any agreement between shareholders that could give rise to any such restrictions.

Rules governing the appointment and dismissal of members of the Executive Board and amendments to the company's articles of association

The rules for the appointment and dismissal of members of the Executive Board are based on Sections 84 and 85 of the German Stock Corporation Act (AktG) and Section 31 of the German Codetermination Act (MitbestG) in conjunction with Article 5 of the company's articles of association.

All amendments to the articles of association require a resolution by the Annual General Meeting with a majority of at least three quarters of the voting stock attending, pursuant to Section 179 of the German Stock Corporation Act (AktG). The right to add amendments of a purely formal nature, for instance changes to the share capital as the result of utilization of the authorized capital, is devolved to the Supervisory Board under the terms of Article 13 of the articles of association.

Authorizations conferred on the Executive Board, especially concerning the issue and purchase of shares

Authorized capitall

In accordance with Article 4 (5) of the articles of association, the Executive Board is authorized until April 20, 2026, to increase the company's capital stock by up to €16 million, with the prior approval of the Supervisory

Board, by issuing, either in a single step or in several steps, new registered non-par-value shares in return for cash and/or contributions in kind (Authorized Capital 2021).

Conditional capital

In accordance with Article 4 (6) of the articles of association, the company's capital stock may be conditionally increased by up to €3,763,952 through the issue of up to 3,763,952 new registered non-par-value shares. The purpose of this conditional capital increase is to issue shares to owners or creditors of convertible bonds and/or bonds with warrants in accordance with the authorization granted to the company under a resolution passed by the Annual General Meeting on April 15, 2015. Shares are issued at a conversion price or warrant exercise price determined on the basis of this authorization.

Until April 14, 2020, the Executive Board was authorized to issue, with the prior approval of the Supervisory Board, bearer and/or registered convertible bonds and/or bonds with warrants (collectively referred to as "bonds") with a total nominal value of up to €500 million. In 2016, MTU made use of this authorization to increase the company's capital stock by issuing a convertible bond with a nominal value of €500 million.

Further, in accordance with Article 4 (7) of the articles of association, the company's capital stock may be conditionally increased by up to €1,600,000 through the issue of up to 1,600,000 new registered non-par-value shares (Conditional Capital 2019). The purpose of this conditional capital increase was to issue shares to owners or creditors of convertible bonds and/or bonds with warrants in accordance with the authorization granted to the company under a resolution passed by the Annual General Meeting on April 11, 2019.

Further, in accordance with Article 4 (8) of the articles of association, the company's capital stock may be conditionally increased by up to €2,600,000 through the issue of up to 2,600,000 new registered non-par-value shares (Conditional Capital 2021). The purpose of this conditional capital increase is to issue shares to owners or creditors of convertible bonds and/or bonds with warrants in accordance with the authorization granted to the company under a resolution passed by the Annual General Meeting on April 21, 2021. Shares are issued at a conversion price or warrant exercise price determined on the basis of this authorization.

The Executive Board is authorized until April 20, 2026, to issue, in a single step or in several steps and with the prior approval of the Supervisory Board, bearer and/or registered convertible bonds and/or bonds with warrants (collectively referred to as "bonds"), with or without maturity date, with a total nominal value of up to €600 million, and to grant the owners of convertible bonds and/or bonds with warrants the right, obligation or option to convert them into registered non-par-value shares of the company representing a stake in the capital stock of up to €2,600,000 under the conditions established for the issue of convertible bonds or bonds with warrants. The bonds may be issued in return for cash contributions only. They may be issued in euros or – to an equivalent value – in any other legal currency, for instance that of an OECD country. They could also be issued by an affiliated company where MTU exercises control. In such cases, and subject to the prior approval of the Supervisory Board, the Executive Board was authorized to act as guarantor for the bonds and to grant the owners of the bonds the right, obligation or option to convert them into new registered non-par-value shares in MTU.

Resolution concerning the authorization to purchase and use treasury shares pursuant to Section 71 (1) no. 8 of the German Stock Corporation Act (AktG) and to exclude subscription rights

Under the resolution adopted at the Annual General Meeting on April 11, 2019, the company received the following authorizations:

a) The company was authorized to purchase treasury shares accounting for a proportion of up to 10% of the company's capital stock, as applicable on the date of the resolution, during the period from April 11, 2019, through April 10, 2024, pursuant to Section 71 (1) no. 8 of the German Stock Corporation Act (AktG). At no point in time may the value of the acquired shares, together with other treasury shares in the company's possession or which are attributed to it pursuant to Section 71a et seq. of the German Stock Corporation Act (AktG), exceed 10% of the company's capital stock. At the discretion of the Executive Board, the shares may be purchased through the stock exchange or by means of a public offer to buy addressed to all shareholders (or – where permitted by law – through a public call to submit a sell offer).

The shares must be sold in return for proceeds that are not more than 10% above or below the quoted share price, net of any supplementary transaction charges. In the case of a sale through the stock exchange, the reference for the quoted share price as defined above is the average value of share prices in the closing auction of Xetra trading (or a comparable successor system) on the last three trading days prior to the purchase of the shares. In the case of shares purchased by means of a public offer to buy addressed to all shareholders (or a public call to submit a sell offer), the reference for the quoted share price is the average value of share prices in the closing auction of Xetra trading (or a comparable successor system) on the last three trading days prior to publication of the offer. In the event of substantial fluctuations in the share price, the Executive Board is authorized to publish a new public offer to buy or a public call to submit a sell offer based on a recalculated average value of share prices computed as outlined in the previous sentence.

The volume of the offer can be limited in the case of shares purchased by means of a public offer to buy addressed to all shareholders (or a public call to submit a sell offer). If the whole take-up of the offer (or the total number of offers) exceeds this volume, the purchase must be transacted in proportion to the number of shares offered. Preferential treatment may be given to small packages (up to 100 shares) offered for sale. Further conditions may be imposed in the offer or call to submit offers.

b) The Executive Board was authorized to sell the purchased treasury shares in a manner other than through the stock exchange or by means of a public offer addressed to all shareholders on the condition that the shares are sold in return for cash payment at a price that is not significantly below the stock market price of similarly entitled shares of the company at the time of sale. However, this authorization shall apply only on the condition that the shares sold excluding subscription rights pursuant to Section 186 (3) sentence 4 of the German Stock Corporation Act (AktG) do not exceed a total amount of 5% of the company's capital stock when this authorization becomes effective or – if such value is lower – when this authorization is exercised. This limit of 5% of the capital stock shall also include option rights and/or conversion rights on shares of the company which are issued during this authorization, i.e., since April 11, 2019, excluding subscription rights in mutatis mutandis application of Section 186 (3) sentence 4 of the German Stock Corporation Act (AktG), as well as the issue or sale of treasury shares without subscription rights pursuant to Section 186 (3) sentence 4 of the German Stock Corporation Act (AktG).

c) The Executive Board was authorized to use the purchased treasury shares in a manner other than through the stock exchange or by means of an offer addressed to all shareholders if the treasury shares are issued to program participants in conjunction with the company's stock option programs and those participants are, or were, employees or service providers of the company or one of its affiliated companies. If shares are to be used by issuing them to active or former members of the MTU Executive Board under the terms of the company's stock option programs, the Supervisory Board is authorized to transact this issue. t.

d) Furthermore, the Executive Board was authorized to use the purchased treasury shares as partial or complete payment in conjunction with business combinations or the acquisition, whether direct or indirect, of companies, parts of companies or holdings in companies.

e) The Executive Board was also authorized, with the consent of the Supervisory Board, to use the purchased treasury shares to exercise conversion rights or discharge conversion obligations relating to convertible bonds, bonds with warrants, profit participation certificates or income bonds (or combinations of such instruments) issued by the company or by a dependent affiliated company.

f) The Executive Board was moreover authorized, with the consent of the Supervisory Board and without any requirement for a further resolution to be passed by the Annual General Meeting, to redeem purchased treasury shares in whole or in part. They may be redeemed in a simplified procedure without any capital reduction and by adapting the arithmetic value of the outstanding portion of non-par-value shares to that of the company's stock capital. The redemption may be limited to a defined fraction of the purchased shares. The authorization to redeem shares may be used on one or more occasions. If the simplified procedure is employed, the Executive Board is authorized to amend the number of non-par-value shares stated in the articles of association.

g) The above-stated authorizations may be exercised on one or more occasions, in whole or in part, individually or in combination. They may also be exercised by Group companies as defined in Section 17 of the German Stock Corporation Act (AktG).

h) The subscription rights of existing shareholders in respect of these treasury shares are excluded insofar as the shares are utilized in the manner stated above in subsections b) to e).

i) The authorization to purchase treasury shares granted to the company on April 15, 2015, is revoked as of the effective date of this new authorization. The authorization to use the treasury shares purchased under the terms of the above-mentioned earlier resolution dated April 15, 2015, remains in force.

Material agreements relating to change of control subsequent to a takeover bid

MTU Aero Engines AG issued a registered bond in June 2013, which grants the creditor a right of early repayment in the event that a third party assumes control of over 50% of the company's share capital with voting rights and this has a negative impact on the company's credit rating.

The convertible bond issued by MTU Aero Engines AG in May 2016 contains the following provisions with regard to a change of control: In the event of a change of control, the bond terms grant bondholders the right to exercise their conversion right within a specific period of time at an adjusted conversion rate. In the event of a change of control, bondholders can redeem their bonds prematurely at the terms described in more detail in the bond conditions. A "change of control" shall be deemed to be when control is acquired or a mandatory takeover offer is published pursuant to Section 35 (2) sentence 1, Section 14 (2) sentence 1 of the German Securities Acquisition and Takeover Act (WpÜG) or, in the case of a voluntary takeover offer, if more than 30% of MTU Aero Engines AG's voting rights are legally or beneficially owned by the bidder or attributed to it pursuant to the bond conditions. If one or more persons within the meaning of Section 22 (2) of the German Securities Trading Act (WpHG) (old version) acquire(s) 50% of the voting rights of MTU Aero Engines AG, this shall represent an "acquisition of control."

The convertible bond issued by MTU Aero Engines AG in September 2019 contains the following provisions with regard to a change of control: In the event of a change of control, the bond terms grant bondholders the right to exercise their conversion right within a specific period of time at an adjusted conversion rate. In the event of a change of control, bondholders can redeem their bonds prematurely at the terms described in more detail in the bond conditions. A "change of control" comprises the acquisition of control or a mandatory offer under Section 35 (2) sentence 1 and Section 14 (2) sentence 1 of the German Securities Trading Act (WpHG). If one or more persons within the meaning of Section 29 (2) and Section 30 of the Securities Acquisition and Takeover Act (WpÜG) acquire(s) 50% of the voting rights of MTU Aero Engines AG, this shall represent an "acquisition of control."

The bond issued in 2020 provides that, in the event of acquisition of 50% or more of the shares (by holding the shares pursuant to Section 33 of the German Securities Trading Act [WpHG] or through attribution pursuant to Section 34 WpHG), MTU Aero Engines AG will fix an optional redemption date when bondholders can redeem all or some of their bonds.

In June 2022, MTU Aero Engines AG agreed a revolving credit facility with a banking syndicate, which provides for a right of termination for the lenders in the event that one or more persons assume(s) control of MTU Aero Engines AG or acquire(s) more than 50% of the company's issued capital.

MTU Aero Engines AG has risk and revenue sharing agreements with an engine manufacturer containing clauses that allow the risk and revenue sharing agreement to be converted into a long-term supplier contract in the event that a material competitor of the contracting party acquires control of 25% or more of the company's voting rights or assets.

In addition, MTU Aero Engines AG has a cooperation agreement with another engine manufacturer. Under this agreement, that manufacturer is entitled to terminate the contract for cause in the event that one of its competitors acquires more than 50% of the company's voting rights. MTU Aero Engines AG has further cooperation agreements with the same engine manufacturer. Under these agreements, that manufacturer is entitled to terminate the contract for cause in the event that one of its competitors acquires more than 30% of the company's voting rights.

MTU Aero Engines AG also has equity investments in various joint ventures with other engine manufacturers, the purpose of which is to cooperate in the development and production of aircraft engines. According to the provisions of the corresponding agreements, MTU Aero Engines AG's share in the joint venture may be withdrawn and its participation in the accompanying cooperation agreements terminated if MTU Aero Engines AG is taken over by a competitor of the partners in these consortia.

It is standard market practice to confer contractual rights of this kind. Should an event meeting any of the above definitions of change of control take place, the exercise of rights ensuing from these agreements could have a substantial impact on MTU's net assets, financial position or results of operations.

Other agreements

Agreements on compensation in the event of a takeover bid

Pursuant to the Executive Board contracts in effect since January 1, 2021, a change of control is deemed to have occurred when a shareholder acquires a majority interest in the company and this entails material disadvantages for members of the Executive Board. Material disadvantages are, in particular, if the Executive Board member is removed, if his/her responsibilities and duties are significantly altered, or if the Executive Board member is asked to accept a reduction in employment benefits or to agree to premature termination of his/her contract of service. In such case, each member of the Executive Board shall have a special right of termination, which is to be exercised within a period of six months, with a period of notice of three months to the end of a month. If a member of the Executive Board makes use of this right, or if the executive employment contract is terminated by mutual consent within nine months after the change of control, the Executive Board member shall receive a severance payment corresponding to the benefits that would otherwise have been awarded up to the date on which the contract would normally have expired. For the calculation of the severance payment, 100% target fulfillment is agreed for the variable compensation components. The maximum amount of the severance payment is limited to two times the target annual direct compensation.

No comparable agreements have been made with regard to other employees.

Other disclosures

Non-financial statement

This non-financial statement of MTU Aero Engines in accordance with the German CSR Directive Implementation Act (CSR-RUG) provides information on material non-financial topics relating to the fiscal year 2022. This is a combined non-financial statement in accordance with Sections 289b et seq. and Sections 315b et seq. of the German Commercial Code (HGB). It contains disclosures relating to MTU Aero Engines AG as the parent company, as well as information relating to the MTU Group. The structure of the Group is described in the *Combined management report under "The MTU Group."*

In addition, in early summer, the company publishes a separate sustainability report for the previous fiscal year in accordance with the international reporting standards of the Global Reporting Initiative (GRI). Since the definition of materiality used by CSR-RUG differs from the definition used by the GRI, MTU has not used any standard as the framework for its non-financial statement.

Business model

The MTU Group and its business model are described in the *Combined management report* under *"The MTU Group."*

Framework

The key topics for the non-financial statement are identified by an interdisciplinary corporate responsibility (CR) team comprising CR Coordination and the CR divisional coordinators in the relevant organizational units, in consultation with the CR Board, which is the central CR decision-making body at MTU, and the Executive Board. In summer 2022, the role of Chief Sustainability Officer (CSO) was created at Executive Board level. In particular, the CSO defines MTU's positioning, its sustainability strategies and its goals. He works closely with the CR Board. The CR Board and CSO together form the highest decision-making body at MTU.

The Group-wide CR strategy is the starting point for a materiality process in which MTU identifies the material topics for the company and its stakeholders. The annual materiality analysis evaluates the positive and negative social and ecological impact (opportunities and risks) of these topics on MTU's business activities. The topics are also evaluated in terms of their relevance for MTU's business, for instance their possible impact on the Group's reputation and on its profit and loss situation.

As a result of this process, for 2022, nine topics were defined as relevant for the non-financial statement in accordance with the German CSR Directive Implementation Act (CSR-RUG). CSR-RUG requires the provision of relevant non-financial information on the business performance, operating results and position of the Group. Information is also required on the impact of its business activities on the following aspects: environmental matters, employee matters, social matters, human rights, combating corruption as well as possible additional aspects. As one such additional aspect, the non-financial statement contains information on product quality and flight safety. The non-financial statement contains one change in the key topics relating to the reporting period: Energy management has been given a higher weighting and merged into "Climate protection at the production locations" because CO_2 emissions from the operation of MTU's sites (Scope 1 and 2 emissions) mainly result from the use of energy. The materiality evaluation of the topics was discussed and confirmed by the Supervisory Board's Audit Committee.

[T38] Contents of the non-financial statement

Aspect in accordance with the German CSR Directive Implementation Act (CSR-RUG)	Key topics for MTU
Additional aspect	Product quality and flight safety
Environmental matters	Climate impact of aircraft engines
	Climate change mitigation at the production sites
Combating bribery and corruption	Prevention of bribery and corruption
Employee matters	Occupational safety
	Employee development
Respect for human rights	Respecting the human rights of employees
	Respect for human rights in the supply chain
	Responsible international trade

Under the CSR-RUG definition of materiality, no relevant topics have been identified for the aspect of social matters.

Involving stakeholders

MTU is also engaged in dialogue with external stakeholders regarding environmental and social impacts. Stakeholders can give feedback on MTU's sustainability management via an online survey. There are also personal and anonymous reporting channels that stakeholders can use to submit complaints and grievances to the company. The Munich, Hanover and Ludwigsfelde sites provide information on their environmental impact and activities in annual environmental declarations.

MTU is committed to the global sustainability initiative, UN Global Compact, and its ten principles including respect for human rights, fair working conditions, protecting the environment and fighting corruption. In addition, the company is represented on relevant initiatives such as the TRACE International anti-corruption initiative.

Risk management for non-financial topics

Risk identification and evaluation for the topics covered by the non-financial statement are based on MTU's established opportunity and risk management. The potential risks to the environment, society and employees resulting from MTU's business activities are compiled and evaluated quarterly by the responsible staff in the departments and the CR Board analogously to the established opportunity and risk process, taking into account, in each case, the probability of occurrence and impact of the risk. In this process, the risk inventory is reviewed for new material topics and aspects.

To supplement the risk management process, MTU has established a compliance system with a separate reporting line. It is organized and managed by the Compliance Officer.

The risk analysis did not reveal any reportable risks with a high probability of having a severe negative impact on the identified non-financial topics.

Product quality and flight safety

Quality and safety are of paramount importance in aviation and the corresponding framework conditions are strictly regulated. Legal requirements for the safe operation of flights are closely monitored by the aviation authorities. This is reflected in the high importance MTU places on product quality and flight safety. The company has to comply with the legal requirements imposed upon it as a development, manufacturing and maintenance organization in the aviation industry. MTU continuously evaluates the regulatory requirements for its business activities in order to obtain or keep the required licenses, approvals and certifications from the aviation authorities.

A Group-wide integrated management system (IMS) ensures compliance with regulatory requirements and internal regulations as well as clear assignment of responsibilities within the company. One principle of the IMS policy is that "Safety takes priority in what we do." The basic framework is enshrined in a management manual that is binding for all employees and managers across the Group. Corporate Quality is a separate organizational unit directly subordinate to the Chief Operating Officer (COO). It reports quarterly to the Executive Board on quality aspects and flight-related incidents. In accordance with the International Civil Aviation Organization (ICAO) standard, the IMS includes a specific safety management process, which defines how to handle safety-related incidents at MTU's locations and in air traffic. Appropriate organizational structures and responsibilities, such as a Flight Safety Board and a Flight Safety Manager, have also been established. High quality standards, together with product safety and reliability, are important corporate objectives that are enshrined in the MTU Principles. MTU's Quality Vision 2025 also focuses on faultless quality, product safety in flight, and high customer satisfaction.

Extensive testing and monitoring processes throughout the value chain

The strict regulatory quality and safety requirements must be complied with throughout the entire product lifecycle of an engine. MTU has therefore implemented processes designed to meet these requirements. For example, the aviation sector has strict rules governing documentation in order to verify the airworthiness of engines and their components. There must be no gaps in documentation over the entire product lifecycle. To ensure compliance with quality and safety requirements, MTU has implemented comprehensive testing and monitoring processes throughout the entire value chain. Components undergo thorough testing, based on their criticality, and are monitored in the production process.

Annual internal audits and quality audits by customers and authorities provide evidence that MTU meets uniformly high standards and is in conformance with regulatory requirements. MTU uses supplier audits to monitor suppliers' compliance with sector-specific requirements. The audits are managed on a site-specific basis. The implementation of MTU's IMS at the individual sites is validated and certified by independent and accredited external auditors.

An attractive partner thanks to high quality and performance

MTU continuously monitors quality and, where necessary, initiates appropriate measures to achieve effective improvements. Providing customers and partners with safe and high-quality products and services helps to keep MTU's business competitive. "We increase the satisfaction of our customers" remained an overarching corporate objective for 2022, as it was in previous years. The sub-targets have been specified with a view to safeguarding the high performance and quality of its products so that MTU remains an attractive partner for its stakeholders. The targets are implemented through initiatives with a long-term focus, which are realized on a continuous basis.

A defined process is in place to ensure that all customer complaints about sub-standard quality of MTU products are followed up and analyzed, and that appropriate measures are defined and implemented to effectively eliminate the root cause. The success of these measures is closely monitored. Customer complaints are evaluated at site level. The number of customer complaints increased at two sites in 2022 but at the majority of sites it was lower or unchanged compared with the previous year.

Ongoing cross-site quality initiatives

MTU is continuously developing its quality management system and regularly takes up suggestions arising, for example, from its collaboration in the international Aerospace Engine Supplier Quality (AESQ) Group and regular site-based and cross-site communication between quality managers. Continuous development focuses first and foremost on the set of rules and internal quality reporting and, especially, the digitalization of quality processes. In addition, regular site-specific training on quality aspects is organized for managers and employees. For example, new employees are required to complete a mandatory training module on the IMS.

MTU has various initiatives designed to continuously improve product and process quality and support revenue growth following the pandemic-induced downturn:

- The "Passion for Quality" campaign launched as part of the quality vision aims to make the contribution made by employees to quality visible in all units and to strengthen quality awareness (Munich, Rzeszów, Hanover and Ludwigsfelde sites)
- The "MRO network development" project is standardizing core processes in the commercial engine maintenance business across all MRO locations on the basis of best practices
- In the "AS13100 implementation" project, MTU is implementing new sector-wide standards developed jointly in the AESQ and enhanced quality management standards (Munich, Rzeszów)

Climate impact of aircraft engines

Emissions-free – that is MTU's vision and its overriding goal of its efforts to reduce the climate impact of aircraft engines. Through its responsibility in the area of climate change mitigation, MTU wants to make a contribution to the Paris climate target, which is its lodestar in the development of technology. When setting its own targets, MTU is guided by the EU Green Deal, which is derived from the 1.5°C target of the Paris Agreement and aims for climate neutrality by 2050. MTU's technology agenda Claire (Clean Air Engine) is focused on possible solutions for aircraft engines and their potential to reduce climate impact and energy consumption. There is a three-step program to achieve these targets: The focus is no longer on CO_2 emissions but on the overall climate impact of air traffic. Alongside CO_2 emissions, that includes non-CO_2 impacts, especially those resulting from emissions of nitrogen oxides and the formation of condensation trails. In response to this paradigm shift, Claire was refocused in the reporting period. This was approved by the Technology steering committee, which included the Chief Operating Officer and Chief Program Officer.

In view of the long product cycles in the aviation sector, the climate goals for engines have a long-term perspective. They are set out in memoranda of understanding with stakeholders (airlines, the aviation industry, research, aviation authorities) such as "Fly the Green Deal," the European vision for climate-neutral aviation. In order to have a widespread impact in 2050 and contribute to the achievement of climate neutrality, the products enabling climate-neutral aviation have to be launched on the market well before 2050. MTU is therefore stepping up the development of completely new propulsion concepts that go beyond conventional gas turbines. It is working on these revolutionary engine architectures with partners from industry, science and research, for example, with Bauhaus Luftfahrt and the German Aerospace Center. In parallel with this, today's engines such as the highly efficient Geared Turbofan™ (GTF) are being driven forward and combined with sustainable fuels.

Multi-level technology and innovation process

MTU manages technology development for future products using a multi-level process. In the mid term, advanced product designs will be generated in order to derive technology requirements. In the long term, pilot concepts will be drafted with the aid of technology radar, and development of the enabling technologies and innovations will be initiated. The next-generation GTF is an example of advanced product design. The pilot concepts are the water-enhanced turbofan (WET) and the flying fuel cell. An Innovation Board regularly discusses all topics related to technology and innovation and initiates technology projects and studies.

Evolutionary and revolutionary concepts for climate-neutral aviation

Together with its partner, Pratt & Whitney, MTU is offering a highly efficient new engine concept: the GTF™ engine family. These engines are used in modern short- and medium-haul aircraft (Airbus A320neo and A220, Embraer E2 family of E-jets). Compared with the previous generation of engines, the GTF reduces both energy consumption and CO_2 emissions by 16%. The GTF Advantage will reduce energy consumption and CO_2 consumption by a further 1 percent, improving performance compared with earlier generations by a total of 17% in each case.

Since it came into service, the GTF™ engine family has clocked up 18 million flight hours and thus avoided 10 million tons of CO_2 (status: first quarter 2023, data from Pratt & Whitney). In the reporting period, the GTF Advantage was successfully tested with 100% sustainable aviation fuel (SAF) – sustainably produced kerosene which can be used on a drop-in basis without major modifications. This fuel will pay a major role in the transition to climate-neutral flying. MTU is engaged in continuous dialog with relevant stakeholders and takes part in studies to support the introduction of SAF, for example, as a member of aireg - Aviation Initiative for Renewable Energy in Germany e.V., an association of airlines, manufacturers, and research institutes. A study on SAF published by aireg with MTU's involvement in 2022 shows the enormous potential of this fuel. MTU is a member of the Cleantech working group led by the Bavarian Ministry of Economic Affairs, Regional Development and Energy. In 2022, this working group completed a feasibility study on electricity-based SAFs. The aim of this working group is to build a power-to-liquid plant in Bavaria.

In order to utilize the full potential of the GTF, MTU and Pratt & Whitney are developing the next generation of the GTF. Many of the technologies required for this are being developed as part of the German aviation research program (LuFo). In the second round of applications in 2022, LuFo approved several collaborative projects for new compressor and turbine technologies. In addition, funding was granted for several projects on digitalization of manufacturing. In the project outline phase of the third call for applications, numerous plans submitted by

MTU were also approved. The primary focus is on improving the efficiency of components and materials and on digitalization.

As described in Claire, evolutionary technology development is not sufficient to achieve climate neutrality by 2050. Revolutionary propulsion concepts are needed. The concept favored by MTU is the water-enhanced turbofan (WET), which harnesses energy from exhaust emissions from the engine. Water is vaporized by a vaporizer and injected into the combustion chamber. The water required for this is obtained from the exhaust emissions via a condenser. This wet combustion concept brings a massive reduction in emissions of nitrogen oxides. At the same time, it greatly reduces fuel consumption, CO_2 emissions and the formation of condensation trails. A milestone for the WET concept in the reporting period was the approval of the SWITCH application for funding under the European Commission's Clean Aviation research program. Within SWITCH, MTU will lead a consortium including prestigious industrial partners such as Pratt & Whitney, Airbus, Collins Aerospace and GKN Aerospace. This consortium will work on the development of innovative WET technologies and hybrid-electric technologies.

Complete electrification of the powertrain is another possibility for a revolutionary propulsion concept. MTU refers to this as the flying fuel cell. Initially, it could be used for regional short-haul flights. This propulsion system does not generate CO_2, NOx or particulate emissions. MTU has obtained support for this research, in particular in the third round of applications for the national aviation research program – several project applications relating to the development of a system that is optimized for aircraft were approved.

Climate change mitigation at the production sites

MTU aims to continuously reduce greenhouse gas emissions in development, production and maintenance activities at its facilities in order to make a contribution to global climate protection, based on the targets of the Paris Agreement. In 2021, MTU introduced an ecoRoadmap at its headquarters in Munich. This was rolled out to all its production sites in Europe (Munich, Hanover, Ludwigsfelde, Rzeszów) in 2022 as MTU Green Europe. The objective of Green Europe is to reduce MTU's CO_2 footprint (measured by material Scope 1 and 2 emissions) by 60% by 2030 compared with the reference base (2019) by introducing sustainable measures, extending in-house emissions-free energy generation and stepping up the use of green energy. In addition, it applies the gold standard to compensate for unavoidable CO_2 emissions at the Munich location. As a result, operation of this location has been climate-neutral since 2021. Integration of the production sites in Canada and Serbia (which started operating in December 2022) in 2023 is currently being considered.

The Executive Board bears responsibility for Group-wide environmental protection at operational level. Standards are implemented through an environmental management system that defines processes, responsibilities and targets at site level. Environmental protection is part of MTU's integrated management system (IMS). The environmental protection criteria apply for all business units and processes and are implemented through process workflows and special company standards. The minimum standard for the operation of machines and facilities such as test stations is set by national legislation and secondary regulations. Environmental and climate protection data are reported to the Executive Board through the quarterly IMS report. Since 2022, this has included energy consumption (relative to production hours) at the fully consolidated production sites in Munich, Hanover, Ludwigsfelde, Rzeszów and Vancouver. As part of Green Europe, the Executive Board and the Steering Committee receive regular reports on CO_2 emissions reduction in the operation of the Munich, Hanover, Ludwigsfelde and Rzeszów sites, based on maximum residual emissions and CO_2 avoided as a result of sustainability measures.

Environmental and climate protection are also an integral part of its global Code of Conduct. Here, the company sets out its commitment to an integrated approach, with environmental and climate protection included in business decisions. Environmental responsibility is explicitly set out in the MTU Principles in the section "Environment and society." Furthermore, MTU expects environmentally conscious action from its suppliers. These expectations are set out in a binding code of conduct.

Employees are actively included in environmental protection through information campaigns and training, for example, to encourage them to save energy at work. These outreach measures include the onboarding process for new employees, an environmental action day for apprentices (Munich location) and short information videos with tips on environmental protection in daily life. MTU's support for its employees environment and climate awareness is an integral part of the Code of Conduct.

Corporate environmental production is organized on a decentralized basis and climate protection is included in the assessment of environmental impacts. Local departments at all production sites are responsible for implementing the relevant measures. The site management bears direct responsibility for environmental protection at each sites. They are advised and supported by internal experts. The specialist departments regularly share information on innovations and best practices. The German sites are certified as complying the international management standard ISO 14001 and/or the EU Eco-Audit Regulation (Eco Management and Audit Scheme, EMAS).

The specialists responsible for climate protection develop sustainable measures for the sites covered by the Green Europe strategy and implement them with the relevant organizational units. Aspects addressed include the use of equipment with poor energy efficiency, systematic elimination of leakages of compressed air and improving insulation by planting or refurbishing roofs. Photovoltaic installations to generate green energy at the Munich and Rzeszów locations are a first step in the transition to green energy. The emissions factor for energy sourced by the Hanover and Munich locations is better than in previous years. As in the previous year, electricity consumption at the site in Poland is already completely emissions-free. MTU is also driving forward the deep geothermal project for its Munich location and the preparatory drilling at the site started in 2022. From the end of 2024, thermal underground water sources could make the supply of heat at the site largely independent of fossil fuels.

The production locations also have local environmental programs that pre-date the ecoRoadmap. For example, the Hanover site has implemented measures to reduce gas and electricity consumption by machinery and in facility management. The "Eco Facility 2025" project at the site in Rzeszów, Poland, aims to reduce environmental impacts and enhance environmentally conscious behavior by employees. However, improvements in the consumption of process media and materials and in waste volumes, expressed in CO_2, are not reflected directly in the MTU Group's CO_2 emissions data because they cannot always be allocated clearly to Scope 1 or 2.

MTU also encourages employees to get actively involved and put forward ideas for climate protection at their site. In the ecoIdeation Challenge held in 2021, employees submitted ideas for low-emissions operation of the Munich location. Their ideas are being pursued both on a decentralized basis by the departments (e.g., Logistics) and centrally (e.g., climate-neutral heating).

CO_2 emissions data for 2022

[T39] CO_2eq emissions in metric tons

	2022	2021
Scope 1		
Group	37,738	42,994
MTU AG	18,482	24,379
Scope 2		
Group	9,387	12,531
MTU AG	5,307	7,032
Total		
Group	47,125	55,525
MTU AG	23,789	31,411

Scope 1 CO2eq emissions result from direct consumption of the fuels kerosene, natural gas (including biomethane), and fuel for mobility purposes. Scope 2 CO2eq emissions are attributable to the consumption of purchased energy (electricity and district heating). The Scope 2 emissions are calculated using the energy suppliers' emissions factors (market-based method). Further sources of CO2 emissions such as other fuels and refrigerants are not reported because their contribution to the Group's emissions is not material. AG = Munich location, Group = fully consolidated production sites; the Nova Pazova production site in Serbia is not included in the report because there were no production operations there in 2022. Consumption in Canada is included in the data, but mobility data are not. External testing of engines and industrial gas turbines generated 300 metric tons CO2eq, while the combustion of SAF in engine testing in Hanover generated 90 metric tons CO2eq. These amounts are not included in the CO2eq data for the MTU Group. The reported emissions cover the twelve-month period from December 2021 to November 2022 or December 2020 to November 2021. The majority of the figures for November are estimates (based on the prior-year figures). Some prior-year figures have been corrected and restated.

In the period under review, CO_2eq emissions from the MTU Group's production sites totaled 47,125 metric tons (2021: 55,525). Scope 1 emissions were 37,738 metric tons of CO_2eq (2021: 42,994 metric tons). Scope 2 emissions were 9,387 metric tons of CO_2eq (2021: 12,531 metric tons). Both Scope 1 and Scope 2 CO_2 emissions at the Munich site are decreasing. The reductions in the Group and at headquarters in Munich were attributable to the Green Europe climate strategy. MTU undertook high-quality offsetting of the remaining Scope 1 and 2 CO_2eq emissions in Munich using the gold standard, so this location was climate-neutral for the first time at the end of 2022.

Reducing CO_2 is an important ESG target

The high priority given to climate protection is also shown by the fact that reducing CO_2 emissions is an important environmental, social and governance (ESG) target. [The ESG-related KPI CO_2 affects the variable compensation of the Executive Board and senior executives. Target achievement is based on Europe-wide implementation of the climate-protection strategy for emissions from the European production sites in Munich, Hanover, Ludwigsfelde and Rzeszów. Measurement of target achievement is based on the remaining CO_2 emissions as "maximum remaining CO_2 emissions" (calculated using the currently valid emissions factors) and "CO_2 abatement through sustainable measures" (calculated using the 2019 emissions factors), taking 2019 as the baseline. The twelve-month performance period used for this is December 1, 2021 through November 30, 2022 and thus differs from the reporting period. The outcome was 44,246 metric tons CO_2, which was below the target level of 54,000 metric tons thanks to consistent action to reduce CO_2 emissions and the purchase of green electricity. The target for abatement through sustainable measures was achieved with a reduction of 2,000 metric tons (target: 1,747 metric tons).

Energy consumption 2022

CO_2eq emissions from production and maintenance activities (Scope 1 and 2) mainly result from the energy consumption required to operate the facilities.

[T40] Energy consumption in mWh

	2022	2021
Scope 1		
Group	169,712	194,471
MTU AG	86,581	114,111
Scope 2		
Group	135,647	128,496
MTU AG	81,614	76,880
Total		
Group	305,359	322,967
MTU AG	168,195	190,991

Scope 1 energy consumption results from the direct consumption of kerosene, natural gas and fuels for mobility (excluding Canada). Scope 2 energy consumption is attributable to the consumption of purchased energy (electricity and district heating). Other energy consumption (e.g. other fuels) is not reported because its contribution to total consumption by the MTU Group is not material. AG = Munich location, Group = fully consolidated production sites; the Nova Pazova production site in Serbia is not included in the report because there were no production operations there in 2022. Energy consumption in external testing of engines and industrial gas turbines was 1,249 MWh; SAF combustion during testing at the Hanover location was 384 MWh. This energy consumption is not included in the data in the table. The consumption data presented are refer to the periods December 2021 through November 2022 and December 2020 through November 2021; some figures for November are estimates (based on the prior-year figures).

In the year under review, the MTU Group consumed a total of 305,359 kilowatt hours energy (Scope 1 and 2) at its production sites (2021: 322,967) and 168,195 kilowatt hours at its production site in Munich (2021: 190,992). The increase in Scope 2 energy consumption in Munich site was mainly attributable to purchased electricity, partly due to prolonged shutdown of the power plant at this site.

Prevention of bribery and corruption

MMTU's long-term business success is based on compliance with the applicable laws and regulations and the company's own internal guidelines. MTU condemns corruption of any kind and all other forms of white-collar crime. A Group-wide Code of Conduct requires employees and management to act with responsibility and integrity and to comply with the law and in-house regulations. The MTU Principles foster consistency, reliability and integrity in MTU's activities. Further regulations such as the MTU standard on donations, sponsorship and customer events contain further details and also help prevent corruption.

As the highest decision-making authority, the CEO bears the responsibility for the company's business ethics and anti-corruption policy. The central functions responsible for ensuring compliance are a Group-wide Compliance Officer and the Compliance Board. The Compliance Officer is responsible, in particular, for ongoing development of MTU's established compliance system to prevent corruption. He works in close consultation with the Compliance Board. The Compliance Board holds both regular and ad-hoc meetings at the invitation of the Compliance Officer. The Compliance Officer submits quarterly reports to the Executive Board and the Supervisory Board's Audit Committee, which in turn reports to the plenary meetings of the Supervisory Board. The Supervisory Board's Audit Committee oversees the Executive Board's compliance activities. In addition, the Compliance Officer has a regular direct reporting line to the CEO.

The company has established a global whistleblower system that allows employees and external stakeholders to report suspected cases of misconduct confidentially to the Compliance Officer. As well as the scope to seek personal contact, the web-based iTrust system can be used to submit reports anonymously. The Compliance Officer examines all allegations received and manages the necessary measures if they prove founded.

Zero tolerance of bribery and corruption

MTU's goal is to prevent bribery and corruption throughout the Group (principle of zero tolerance). To minimize corruption risks, all sales-related consultancy contracts are reviewed by the Compliance Officer, where relevant with the assistance of external service providers, before they are concluded or renewed. The Corporate Audit unit examines the legal conformity of business processes and compliance with internal guidelines through regular audits.

There were no confirmed cases of corruption in the reporting period.

External standards and memberships

MTU's compliance management system is based on the requirements of assurance standard IDW AsS 980 published by the Institute of Public Auditors in Germany and the Good Practice Guidance on Internal Controls, Ethics, and Compliance issued by the Organisation for Economic Co-operation and Development (OECD). It has also signed the standards issued by the Aerospace and Defence Industries Association of Europe (ASD), which aim to prevent bribery and corruption and encourage fair and equal competition. In Germany, this initiative is led by the German Aerospace Industries Association (BDLI). Moreover, these standards are a binding element of contracts with sales consultants.

Continuous development of the compliance system

MTU strives to continuously develop its compliance system. That includes raising employees' awareness of compliance-related matters, for example, with the aid of training materials on the Code of Conduct. Training with these new training materials, which were introduced in 2021, continued in the reporting period. 3,131 employees had taken part by year-end 2022. In addition, mandatory anti-corruption training is regularly held for managers and employees in specific functions such as sales. In the reporting period, routine corruption prevention training was organized for relevant employees in maintenance sales.

Occupational safety

MTU places a great deal of importance on the safety of its employees. Employee health and safety are included in the Group-wide Code of Conduct as key principles of corporate social responsibility. The Code of Conduct also specifies that workplaces must meet statutory and generally recognized industrial health and safety standards. In addition, MTU has an internal standard that contains generally valid parameters, rules and definitions of performance indicators. Quarterly Group-wide reporting to the Executive Board is established. Occupational safety is organized on a decentralized basis at MTU and the sites are responsible for implementing the relevant requirements. At the company's production sites, occupational safety is the responsibility of the site management and occupational safety officers are appointed at management level. The responsible local departments implement site-specific occupational safety requirements and report regularly to the site management. The company's production sites in Germany, Poland and Canada have local occupational safety committees, which include representatives of the workforce.

Occupational safety is part of MTU's integrated management system (IMS) and is regularly reviewed and driven forward. At the European production sites, workplace regulations that are mandatory for all employees contain important safety rules pertaining to accident prevention, fire protection and what to do in the event of workplace or commuting accidents.

MTU strives to minimize health and safety risks to its employees and third parties, whilst also seeking to make continuous improvements, for example, through regular workplace assessments and continuous prevention work. Workplaces are regularly assessed for any risks and hazards they present for employees so that appropriate measures can be implemented where necessary. To prevent accidents and achieve a lasting reduction in the number of accidents, the local occupational safety specialists record all accidents using uniform criteria (categories 1-5 from narrowly avoided to fatal accidents) and analyze them with the employees involved and their managers. Where the analysis reveals significant accident hotspots, the causes are investigated and appropriate steps taken to prevent a recurrence. In addition, near-misses are recorded and evaluated at all production sites. Group-wide safety instruction is mandatory for all employees at least once a year and trained first responders have been named. In addition, the responsible local departments undertake prevention work through training sessions and information on occupational safety issues. Temporary staff are included in occupational safety on the same basis as permanent employees.

The occupational safety management systems at MTU's German locations are certified externally as conforming to standard ISO 45001 Occupational health and safety management systems. MTU sets an annual tolerance threshold for workplace accidents at its production locations. This comprises the sum of non-reportable category 3 accidents resulting in between one and three days absence and reportable category 4 accidents resulting in more than three days absence, excluding in each case commuting accidents. The tolerance threshold ranged from 0 to 14 accidents per location in 2022. One of the five production sites was within the target.

[T41] Workplace accidents

	2022	2021
Accidents with absence		
Group	63	67
MTU AG	23	24
Accident rate per 1,000 employees		
Group	5.4	6.2
MTU AG	3.9	4.3

The accident statistics (excluding commuting accidents) cover the entire workforce, including apprentices, interns, school and university students, employees on limited term contracts and temporary staff. Accidents involving contractors' employees are not included. The data do not include accidents during mobile working. The accident figures for the Vancouver site in 2021 have been corrected. Unlike previous reporting, the accident rates for 2022 and 2021 include all accidents resulting in absence (categories 3 and 4) relative to the total workforce plus temporary staff.

In the reporting period, the MTU Group recorded 63 accidents resulting in absence from work (category 3 and 4 accidents resulting in absence of at least one day) (MTU AG: 23). The number of accidents was therefore slightly lower than in the previous year. Moreover the Group-wide accident rate dropped from 6.2 in the previous year to 5.4 accidents per 1,000 employees (AG 2022: 3.9/2021: 4.3). The number of accidents is therefore low overall and is well below the sector average for the German metal-working industry (33.1 reportable accidents per 1,000 employees resulting in more than 3 days absence (category 4) according to the Wood and Metal Trade Association [GB Holz und Metall], 2021 data). As in previous years, there were no fatal accidents at MTU.

Preventive workplace safety is very important

Preventive workplace safety is implemented on a site-specific basis. Interdepartmental networking supports mutual learning and standardization within MTU. The local occupational safety officers derive proactive measures from regularly updated risk assessments, routine inspections of workplaces and audits of production and administration. The results of such analyses and workplace assessments are used as a basis for the safe and ergonomic design of new workplaces. Examples resulting from internal audits and inspections are harmonized training of crane operators and an explosion-proofing standard for safe storage cabinets.

All accidents are reported and evaluated. The analyses show that MTU's plant and machinery generally have a very high level of technical and organizational safety, so the cause of many accidents tends to be attributable to behavior rather than to the operation of plant and equipment. Therefore, measures once again focused on promoting safe working practices and enhancing the safety culture. Ergonomic workplace design was given high priority, for example, by introducing technical aids in Munich. Based on results of employee surveys on occupational safety, risks and hazards, MTU introduced safety measures at its production facilities in Munich in the reporting period. These included the introduction of new personal protection equipment and specific measures to prevent, e.g., cuts. A new hazard assessment survey on mental stress was conducted in collaboration with occupational management and the Works Council. In addition, a Safety First occupational safety drive was introduced at the Munich site in 2022 to raise employee awareness. The Ludwigsfelde organized an open Health and Safety Day for all employees. The Hanover site organizes joint inspections on order and cleanliness for work safety. Once a month a team comprising the safety officer, a team leader and a production supervisor inspect an area of the shop outside their sphere of responsibility. The area to be expected by these teams changes every two months. “Safety mirrors” have been installed in the restrooms at the Rzeszów location to remind employees of their responsibility for on-site safety.

Employee development

Innovative capability and competitiveness are key success factors in the aviation industry. MTU is convinced that continuous and intensive employee development is essential for this and therefore invests in vocational and further training and in the development of talented employees. In response to these times of change, the company is extending its leadership competencies to include change leadership.

Moreover, in many of the areas in which MTU operates, training requirements are defined by the aviation authorities. One example is mandatory training on human factors (human error). In addition to industry-specific vocational training, for example, of aircraft maintenance engineers, and dual courses of study aimed at building up knowledge over the long term, MTU encourages further training of its employees. This is a key principle of corporate social responsibility defined in the company's Code of Conduct. Promoting further training and individual development perspectives for employees and managers are also enshrined in the MTU Principles and Group-wide HR strategy. The head of human resources is responsible for training and development of employees Group-wide. The Executive Board is updated on training indicators once a year through the education and training report, and specific training initiatives are discussed and initiated by the Executive Board.

The enormous importance of vocational and further training is reflected in the extensive range of training and development offers and MTU's spending on staff training. That is based on a Group-wide works agreement in Germany, which guarantees all staff access to training and requires managers to discuss development options with their employees (training interview). In addition, at the three sites in Germany (Munich, Hanover, Ludwigsfelde), the works council is involved in further training of employees in accordance with the German Codetermination Act. It has a say in the training program. The sites in other countries also have further training regulations. At MTU Aero Engines North America, for example, all employees receive an annual Development Plan that fosters individual development and sets out specific measures.

Employee development and lifelong learning help employees hone and develop their skills. Training requirements are established annually in a standard process either in an training interview where employees discuss training with their manager or by MTU's internal further training team on the basis of divisional/company-level interviews. Completed training and development courses are documented in a training history. Training officers are available to provide advice on needs-focused training.

A multilingual online learning portal is an important basis for extending multimedia learning. Increased use of digital and hybrid formats is expected to ensure upskilling of staff at all levels and to provide flexible support. The online learning portal offers employees the opportunity to organize training for themselves, in consultation with their manager. The employee development team uses a rolling training concept so that each year it can respond to specific changes in the needs of MTU and its business environment. Employees also have access to a future readiness program to encourage a digital mindset. Available in various formats, this open offering is a platform for networking and sharing information.

Strengthening leadership competencies in times of change

Change leadership has become an important leadership competency. Therefore, MTU is driving forward the development of managers as champions and drivers of change to strengthen the company's performance base for the future. The MTU Leadership Values ("We transform, We empower, We create trust") create a common set of values and principles for managers. The values provide guidance and define leadership expectations. The company therefore reinforced its leadership value process using a variety of formats.

Virtual leadership nuggets on selected management topics provide guidance and ideas that managers can use in their daily work. A leadership forum regularly provides relevant information on key aspects such as hybrid leadership and trust in periods of crisis. Change Leadership Days are large-scale live events that provide a platform for inspiration and interaction. A change team at HR supports local managers in the implementation of changes and drives forward Group-wide change processes such as the Innovation Culture project. Participation in these offerings is voluntary.

In addition, MTU offers development opportunities and programs at all levels to identify and support talented employees in the best possible way and to support the professional development of those already appointed to management positions. One central tool is the Development Center, which uses exercises and interviews to help individuals with potential in the MTU Group draw up an individual development plan to prepare for leadership functions. The aim of the defined process at the Development Center is to undertake an objective assessment of talented employees and raise their visibility in the company. As well as nationwide Development Centers in Germany, an international Development Center was organized in the reporting period. Around 91% of the managers appointed to leadership functions in 2022 attended a Development Center (AG: 94%). This high rate reflects the fact that the removal of the Covid-related restrictions enabled us to increase the number of Development Centers again.

Talent management also includes a mentoring program to assist potential at the German locations in the professional and personal development through exchange and networking across organizational and hierarchical boundaries. Potentials are employees with the potential to assume functional or disciplinary leadership roles. Designation as a potential is the first step towards participation in the talent management process.

MTU offers both new and experienced managers opportunities to receive management transition coaching and box stop coaching, with scope for reflection and sparring.

Furthermore, fostering talented women and equality in management are important to the Group. In the light of this, MTU offers female staff support in their careers through a range of measures such as participation in the company-wide cross mentoring program in Munich, and the internal Network of Engine Women, which promotes networking on topics such as career advancement. *Further information on diversity and support for women is presented in the Corporate Governance report.*

Snapshot of the mood at MTU

Regular employee surveys are an important yardstick for successful teamwork and leadership. Since 2020, MTU has conducted surveys in short cycles at its German locations. These "pulse checks" comprise a short online questionnaire to obtain a rapid snapshot of the current mood in the organization. The questions are on various topics relating to the present working situation. [The results of the pulse check are included in the environmental, social, and governance (ESG)-related KPI which influences the Executive Board's variable remuneration. The KPI is derived from employee feedback on the areas of leadership and commitment. Only answers that are explicitly positive are taken into account. The overall index for 2022 derived from the two pulse checks was around 77% and thus above the target of 75% .√] MTU is preparing to introduce feedback tools to supplement the pulse check in 2023. It also receives regular feedback from its location in Rzeszów, Poland, through an employee survey.

Training and employee development are very important

Qualified employees with a sound vocational training are also important to MTU. In 2022, it enabled 95 young people in Germany to embark on vocational training. For its new location, MTU Maintenance Serbia, vocational training based on the German dual training system has been set up in cooperation with the Aviation Academy in Belgrade. To ensure that the new employees are highly qualified and to prepare them for their jobs and the specific requirements of the aviation sector, most of them receive on-the-job training over several months at MTU's three sites in Germany.

MTU continued to invest extensively in staff training in 2022. Group-wide, MTU invested a total of €5.4 million in staff training (2021: €4.2 million). At MTU AG, it spent 3.4 million on staff training (2021: €2.7 million) (costs for internal and external training, excluding vocational training). The increase correlates, on the one hand, with an increase in face-to-face training sessions, which are more cost-intensive, and on the other, with the fact that many training sessions that had been postponed during the coronavirus pandemic were held.

Respecting the human rights of employees

MTU respects the internationally proclaimed human rights set out in the United Nations' Universal Declaration of Human Rights. Human rights are integrated into the corporate culture with the aid of various tools to ensure they are respected and promoted. In particular, MTU strives to prevent employees being exposed to any violation of their human rights (zero-tolerance principle).

MTU is committed to respecting the individuality and dignity of every individual, maintaining equality of opportunity in the workplace and preventing discrimination wherever possible. The protection of human rights, the right to appropriate remuneration as well as recognition of regulations governing employee and union representation under labor and works constitution law are implemented Group-wide through the Code of Conduct. As an employer, MTU aims to create fair working conditions based on legally binding employment contracts and appropriate remuneration. This includes freedom of association and the right to adopt collective agreements. Compliance with the Code of Conduct and ethical principles is also enshrined in the MTU Principles. The MTU Principles stress that respecting human rights is an essential element in MTU's social and societal responsibility.

In Germany, MTU is bound by the General Act on Equal Treatment (AGG), which prohibits discrimination against employees and job applicants. In addition, there are internal guidelines on fair and cooperative conduct, which are designed to prevent bullying, sexual harassment and discrimination. These guidelines were adopted in consultation with the representatives of the workforce and include a systematic process for dealing with complaints.

Reporting processes are in place to ensure structured and effective tracking of complaints and reports of breaches of human rights. Reports can be made confidentially within the Group to the Compliance Officer or via the web-based reporting system iTrust. In addition, site-specific reporting structures have been set up. In line with the provisions of, for example, the General Act on Equal Treatment (AGG), every site in Germany has designated contacts who are appropriately trained and to whom employees can address any complaints of discrimination. There is also a female contact person that women can turn to in case of sexual harassment. At MTU Maintenance in Canada, employees can make a formal complaint to the head of Human Resources in the event of discrimination. In addition, employees have the right to submit a formal complaint externally to the BC Human Rights Tribunal. At MTU Aero Engines Polska this function is carried out by an elected employee representative. In addition, employees can report complaints to managers, the works council or the head of human resources. The Executive Board is informed about infringements depending on the severity of their impacts.

The German Act on Corporate Due Diligence Obligations in Supply Chains, which came into effect in 2023, requires responsible management to respect human rights in internal and external supply chains. In the reporting period, MTU paved the way for the appointment of a Human Rights Officer.

When they join the company, new employees are informed about the principles set out in the Code of Conduct and – in Germany – the General Act on Equal Treatment (AGG), and they undertake to comply with these requirements. In addition, MTU provides regular training on the Code of Conduct at all the company's sites and all hierarchical levels. Furthermore, information on the prevention of discrimination is provided on the company's intranet.

In 2022, there were once again no substantiated complaints under applicable anti-discrimination laws at any sites in the MTU Group.

Respect for human rights in the supply chain

MTU respects the internationally recognized human rights enshrined in the UN Declaration of Human Rights. It extends this to its supply chain as well. The aim is to ensure the observance of human rights and fair working conditions.

A code of conduct for suppliers is in place to cover the upstream value chain. MTU's suppliers are required to give an undertaking that they will comply with this Code of Conduct for MTU Suppliers, which is based on the ten principles of the UN Global Compact and the core labor standards of the International Labour Organization (ILO). The Code of Conduct requires suppliers to respect and apply human rights, and to make sure that they are not complicit in human rights violations. In particular, it requires observance of labor standards relating to freedom of association, the right to collective bargaining, the ban on forced and child labor, equal pay regardless of gender and the equal treatment of employees. MTU also expects its suppliers to obtain a corresponding undertaking from sub-suppliers and reserves the right to terminate any contract with a supplier without notice if the supplier uses child labor in the production process for its deliveries. In addition, these principles of behavior are contained in the general business conditions and the contractual documents for suppliers.

Suppliers to the sites in Germany, Poland and Canada and the subsidiary MTU Aero Engines North America are subject to a regular risk analysis. This takes account of MTU-specific product groups and the countries where they are sourced, based on the evaluation in the Walk Free Foundation's Global Slavery Index. This risk analysis is integrated into the established risk process for suppliers. As a further step, there are plans to monitor significant suppliers' compliance with sustainability criteria. For this purpose, MTU has established and started to roll out an ESG assessment tool (ESG = environmental, social, governance). A pilot project to monitor the sustainability performance of OEM suppliers has started. In addition, at MTU Maintenance, a structured supplier evaluation is performed twice a year for suppliers to the German sites.

Various measures are used to achieve the goal of ensuring that human rights are respected in the supply chain. These apply, above all, to the procurement of tantalum, tin, gold and tungsten, which are used in some MTU components. Procurement of these minerals can be problematic because some of them come from Central African mines where the profits may be used specifically to fund armed conflicts that violate human rights. MTU strives to ensure a sustainable and transparent value chain without these "conflict minerals." The company does not procure minerals directly but they enter production and pre-production via the global, multi-step supply chain. The general conditions of business and the templates for contracts with MTU suppliers require information on the origin of minerals. This information is compiled using the EICC/GeSI Conflict Minerals Reporting Template. MTU makes it compulsory for relevant suppliers of components containing minerals declared in the Dodd-Frank Act to provide information once a year on the origin of minerals and specifies that minerals may only be procured from certified mines and smelters (compliant smelter list) in order to ensure that the value chain does not contain conflict minerals. Based on its survey in 2022, MTU has no indication that components from its suppliers contain conflict minerals.

Moreover, in the reporting period there were no reported indications that suppliers had violated the human rights provisions of the Code of Conduct for MTU Suppliers. Furthermore, MTU did not have to terminate its relationship with any suppliers as a result of breaches of human rights.

The German Act on Corporate Due Diligence Obligations in the Supply Chain (LkSG) will apply to MTU Aero Engines AG from 2023. In the reporting period, an interdisciplinary project team started to prepare for its implementation.

Responsible international trade

Trade compliance plays a vital role for MTU. One important goal here is to avoid violations of human rights. The provisions of international trade legislation apply to all business units and Group companies, including their employees. Customs and export control laws govern which products, services and technical data MTU is permitted to sell or pass on to whom, for what purpose and where. Compliance with customs legislation and international trade regulations is explicitly stipulated in MTU's Code of Conduct.

Export control law prohibits doing business with specific countries or individuals, and the supply of sensitive goods, transfer of advanced technologies, and provision of military services without explicit authorization by the respective official bodies. This is intended, in particular, to prevent the proliferation of nuclear, biological and chemical weapons, to prevent the supply of military goods or goods that can be used for military purposes to crisis regions, to prevent support for blacklisted individuals and activities that violate human rights, and to protect sovereign security interests. Under customs regulations, MTU is required to provide a precise description, detailed itemization and accurate declaration of the value of all goods intended for import or export. What is more, anti-boycott laws may prohibit individuals and entities from participating in other countries' economic boycotts and restrict the dissemination of information relating to business activities or individuals.

To ensure international trade regulations are implemented throughout the Group, MTU has set up a central international trade department (functional responsibility and supervisory authority for export control, coordination of customs regulations), which draws on the support of external consultants where necessary. To ensure compliance with international trade regulations, harmonized process standards have been introduced Group-wide. These verify conformity with export control regulations and required authorizations prior to the dispatch of documents and components. The head of the international trade department reports disciplinarily to the head of purchasing and has a direct duty to report to the Executive Board member responsible for exports.

In the reporting period, MTU continued compulsory training of all employees affected by export control regulations, which has been based on a new training concept since 2020. The Internal Compliance Program (ICP) was revised to bring it into line with the legal framework applicable for the reporting period.

Disclosures on the EU taxonomy

Background

A key objective of the EU Action Plan for Financing Sustainable Growth is to reorient capital flows towards sustainable investment. In light of this, Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (subsequently referred to as the EU Taxonomy Regulation) came into effect in mid-2020. This Regulation contains a uniform and legally binding classification system defining which economic activities are deemed to be “environmentally sustainable” in the EU. The results of this classification have to be reported annually on a company-specific basis.

Article 9 of the EU Taxonomy Regulation sets out the following six environmental objectives:

a) Climate change mitigation;

b) Climate change adaptation;

c) Sustainable use and protection of water and marine resources;

d) Transition to a circular economy;

e) Pollution prevention and control;

f) Protection and restoration of biodiversity and ecosystems.

To supplement the requirements on sustainable economic activities within the meaning of the Taxonomy Regulation, the EU Commission has issued delegated acts. Delegated Regulation (EU) 2021/2139 of June 4, 2021 on the technical screening criteria (Del. Reg. TS) for the environmental objectives “Climate change mitigation” and “Climate change adaptation” sets out the technical screening criteria to be used to assess the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and determine whether that economic activity does no significant harm to any of the other environmental objectives. By contrast Delegated Regulation (EU) 2021/2178 of July 6, 2021 specifying the content and presentation of information to be disclosed (Del. Reg. C&P) addresses the content and presentation of the information to disclosed with respect to environmentally sustainable economic activities and the methodology to comply with the disclosure obligation.

With regard to the classification of an economic activity as "environmentally sustainable" within the meaning of the EU taxonomy, a distinction has to be drawn between those activities that are taxonomy-eligible and those that are taxonomy-aligned. Only those economic activities that are described in the delegated acts on technical screening criteria are deemed to be taxonomy-eligible.

If an economic activity is classified as taxonomy-eligible, the next step is to evaluate whether it makes a substantial contribution to one of the environmental objectives and does no significant harm to another environmental objective and is undertaken in compliance with minimum safeguards in accordance with OECD Guidelines for Multinational Enterprises, the UN Guiding Principles on Business and Human Rights, the ILO core labor standards and the International Bill of Human Rights. If all of these criteria are met, the economic activity can be classified as taxonomy-aligned.

In view of the obligation to publish a non-financial statement, MTU is required to apply the rules set out in the Taxonomy Regulation. In accordance with Section 315e (1) HGB, the consolidated financial statements of MTU as of December 31, 2022, have been drawn up using the IFRSs.

In the 2021 reporting period, mandatory disclosures were only required on the taxonomy-eligible proportion of turnover, capital expenditures (CapEx) and operating expenditures (OpEx) associated with the two environmental objectives "climate change mitigation" and "climate change adaptation."

Building on this, for 2022, MTU is required to make further disclosures on taxonomy alignment. Since the plans to extend the EU Taxonomy by issuing delegated acts for the remaining four environmental objectives in 2022 were postponed, the mandatory reporting still relates only to the first two environmental objectives.

The delegated acts published to date on these two environmental objectives do not contain a separate economic activity in connection with the "manufacture of aircraft and their components." Consequently, the treatment of the entire aviation sector has not yet been conclusively addressed. For this reason, in addition to the mandatory disclosures, for the 2022 reporting period, MTU is therefore publishing voluntary, unaudited disclosures based on the information published by the Platform for Sustainable Finance "TECHNICAL WORKING GROUP PART B – Annex: Technical Screening Criteria" on the corresponding requirements for the aviation industry.

The amounts used to calculate the turnover, CapEx and OpEx KPIs are therefore based on the corresponding figures reported in the consolidated financial statements. If capital expenditures and operating expenditures cannot be allocated to a single engine, allocation keys are applied. The data basis for the allocation keys is the proportion of taxonomy-eligible and taxonomy-aligned turnover. In principle, all consolidated companies in the MTU Group are included in the calculation.

The disclosure of taxonomy-eligible and taxonomy-aligned turnover / capital expenditures (CapEx) / operating expenditures (OpEx) as a proportion of the respective total amounts for the MTU Group for the fiscal year 2022 is based on a full analysis of the Group's business activities.

Key performance indicators (KPIs)

[T42] EU-Taxonomy KPI's

in percent	Taxonomy aligned	Taxonomy eligible, but not aligned	Taxonomy non-eligible
Turnover		10	90
CapEx	2	31	67
OpEx	25	28	48

Turnover KPI

The turnover KPI comprises turnover from taxonomy-eligible or taxonomy-aligned economic activities in a fiscal year as a proportion of total turnover in the fiscal year. The basis for calculating the turnover KPI is the net revenue generated by goods and services, including intangibles, in accordance with IAS 1.82(a).

The denominator used to calculate this KPI is the total revenue of €5,330 million in 2022, as reported in the MTU Group's income statement for the fiscal year. This is examined across all Group subsidiaries to identify whether it was generated by taxonomy-eligible economic activities as defined in Annex I (contributes substantially to climate change mitigation) and Annex II (contributes substantially to climate change adaptation) to Delegated Regulation 2021/2139 to the Taxonomy Regulation.

Based on the current status of the regulations, for the economic objective "climate change mitigation," the economic activity 3.6 "Manufacture of other low carbon technologies" was identified as a material revenue-generating economic activity of the MTU Group within the meaning of the delegated act. On this basis, MTU classifies as taxonomy-eligible those revenues corresponding to this economic activity that are geared to achieving a considerable reduction in greenhouse gas emissions in other sectors of the economy.

Revenue from the production of especially low-carbon engine technologies designed to contribute to a considerable reduction in greenhouse gas emissions in the aviation industry falls within the scope of this definition. This analysis of activities geared to a considerable reduction in greenhouse gas emissions took into account customary product life cycles for the respective model types and a comparison of alternative technologies, generally previous technologies, that are currently found on the market. A CO_2 reduction of 10% or more is regarded as a considerable reduction. In 2022, taxonomy-eligible turnover was therefore €515 million.

Based on a detailed analysis, a taxonomy-eligible turnover KPI of 10% and a taxonomy-aligned turnover KPI of 0% are derived. MTU's turnover is not taxonomy-aligned because, as of the reporting date, it did not meet the criteria a substantial contribution to economic activity "3.6 Manufacture of other low carbon technologies."

The increase in the taxonomy-eligible turnover KPI from 8% in the previous year to 10% in the reporting period is attributable to increased sales of the most recent generation of engines.

For more detailed information on the turnover KPIs, please see the corresponding table at the end of this section.

CapEx KPI

In accordance with subsection 1.1.2.2. of Annex I to Del. Reg. C&P, the CapEx KPIs show the proportion of capital expenditures which

- relate to assets or processes associated with taxonomy-eligible and taxonomy-aligned economic activities,
- are part of a CapEx plan to expand an environmentally sustainable economic activity, or
- relate to the purchase of products and services from taxonomy-eligible and taxonomy-aligned economic activities.

The basis for calculating capital expenditures comprises additions to property, plant and equipment and intangible assets in the fiscal year under review, before depreciation and amortization and before any remeasurements relating to the year concerned. Capital expenditures also include additions to property, plant and equipment and intangible assets resulting from business combinations (application of IFRSs [IAS 16, 38, 40, 41, IFRS 16] and national accounting methods). Acquired goodwill is not taken into account. Total capital expenditures as defined in the EU Taxonomy Regulation amounted to €447 million in 2022.

Taxonomy eligibility and taxonomy alignment as defined in Annex I (contributes substantially to climate change mitigation) and Annex II (contributes substantially to climate change adaptation) of the Taxonomy Regulation are determined by analyzing the project description of the additions of assets.

The sum of the additions that constitute taxonomy-eligible capital expenditures is €147 million. The largest contribution comes from capital expenditures in connection with economic activities “3.6 Manufacture of low-carbon engine technologies” and “7.1 Construction of new buildings.” The taxonomy-eligible capital expenditures amount to 33% of total capital expenditures.

Taxonomy-aligned capital expenditures that aim to reduce greenhouse gas emissions and expand the taxonomy-aligned economic activity “3.6 Manufacture of other low carbon technologies” result from the research activities relating to economic activity “9.1 Close to market research, development and innovation,” as set out in the capital expenditure plans. The capital expenditures plans comprise capital expenditures and operating expenditures that aim to expand taxonomy-aligned economic activities, in this case, to the initial performance of a taxonomy-aligned activity. MTU‘s current understanding of the EU Taxonomy is that capital expenditure plans can be disclosed if the research and development plans are comprised almost entirely of operating expenditures (OpEx). By investing in research and development for engine technologies with a low climate impact, MTU is contributing to the climate change adaptation objective. Overall, the plans relate to various research projects that MTU expects to become taxonomy-aligned under the activity “9.1 Close to market research, development and innovation” in the next six to ten years. The planning horizon for the relevant research projects corresponds to the customary development cycle for aviation technology. MTU is planning taxonomy-aligned expenditures for research and development of €946 million in the aforementioned period. As part of capital expenditure plans in 2022, MTU calculates taxonomy-aligned expenditures of €7 million in connection with economic activity “9.1 Close to market research, development, and innovation.” Based on this assessment, 2% of capital expenditures in the year under review were taxonomy-aligned.

There was no material change the taxonomy-eligible CapEx KPI compared with the previous year (34%).

For more detailed information on the CapEx KPIs, please see the corresponding table at the end of this section.

OpEx KPI

In accordance with subsection 1.1.3.2 of Annex I to Del. Reg. C&P, the OpEx KPIs show the proportion of operating expenditures which

- relate to assets or processes associated with taxonomy-eligible and taxonomy-aligned economic activities,
- are part of a CapEx plan to expand an environmentally sustainable economic activity, or
- relate to the purchase of products and services from taxonomy-eligible and taxonomy-aligned economic activities.

The basis for calculating operating expenditures comprises direct, non-capitalized research and development expenses, renovation of buildings, short-term leases, maintenance, and all other direct expenditures relating to day-to-day servicing of property, plant and equipment by the company or third parties that are necessary to ensure the continued and effective use of such assets.

The numerator is derived from the sum of the costs listed above by means of a detailed analysis of accounts and cost centers. The total operating expenditures pursuant to Taxonomy Regulation Article 8 | Annex I Point 1.1.3.1 of Annex I to Del. Reg. C&P are €250 million.

The numerator of the OpEx KPI as defined in the point 1.1.3.2. of Annex I to Del. Reg. C&P is that portion of the operating expenditures contained in the denominator that relates to assets or processes that are associated with taxonomy-eligible economic activities as defined in Annex I (contributes substantially to climate change mitigation) and Annex II (contributes substantially to climate change adaptation) to the Taxonomy Regulation.

A large proportion of the taxonomy-eligible operating expenditures of €131 million comprises non-capitalized research and development expenses. Consequently, the analysis of the taxonomy eligibility of research and development expenses is of material significance for the calculation of the OpEx KPIs.

Different methods are used for product-related development and research activities. Development expenses are determined on the basis of the economic activity to which they relate ("3.6 Manufacture of other low carbon technologies") based on allocation to engine types. Research expenses are allocated to the economic activity "9.1 Close to market research, development and innovation" and serve to extend taxonomy-eligible and taxonomy-aligned economic activities Taxonomy-eligible operating expenditures account for 52% of total operating expenditures.

Taxonomy-aligned operating expenditures are also determined on the basis of the capital expenditure plans. The parameters are the same as those outlined in the section above on the CapEx KPI. In 2022, the research and development expenses allocated to activity "9.1 Close to market research, development and innovation" were €62 million. That was 25% of operating expenditures.

Taxonomy-eligible operating expenditures increased compared with the previous year (33%). This increase was due to the allocation of product-related development expenses that are taxonomy-eligible but not taxonomy-aligned to the economic activity "3.6 Manufacture of other low carbon technologies."

For more detailed information on the OpEx KPIs, please see the corresponding table at the end of this section.

In the calculation of the above KPIs, double-counting of economic activities was avoided by applying various controls, including the documentation of data generation and ensuring that the data are reconcilable with other financial information.

[T43] Template: Proportion of turnover from products or services associated with Taxonomy-aligned economic activities - disclosure covering year 2022

				Substantial Contribution criteria						DNSH criteria										
Economic activities	Codes	Absolute turnover (Mio. €)	Proportion of turnover (%)	Climate change mitigation (%)	Climate change adaptation (%)	Water marine resources (%)	Circular economy (%)	Pollution (%)	Biodiversity and ecosystems (%)	Climate change mitigation (Y/N)	Climate change adaptation (Y/N)	Water marine resources (Y/N)	Circular economy (Y/N)	Pollution (Y/N)	Biodiversity and ecosystems (Y/N)	Minimum safeguards (Y/N)	Taxonomy-aligned proportion of turnover year N (%)	Taxonomy-aligned proportion of turnover year N-1 (%)	Category (enabling activity) (E)	Category (transitional activity) (T)
A. Taxonomy-eligible activities																				
A.1 Environmentally sustainable activities (Taxonomy-aligned)																				
Turnover of environmentally sustainable activities (Taxonomy-aligned) (A.1)																				
A.2 Taxonomy-eligible but not environmentally sustainable activities (not Taxonomy-aligned activities)																				
Manufacture of other low carbon technologies	3.6	515	10																	
Turnover of Taxonomy-eligible but not environmentally sustainable activities (not Taxonomy-aligned activities) (A.2)		**515**	**10**																	
Total (A.1 + A.2)		**515**	**10**																	
B. Taxonomy-non-eligible activities																				
Turnover of Taxonomy-non-eligible activities (B)		**4,815**	**90**																	
Total (A + B)		**5,330**	**100**																	

[T44] Template: Proportion of CapEx from products or services associated with Taxonomy-aligned economic activities - disclosure covering year 2022

				Substantial Contribution criteria						DNSH criteria										
Economic activities	Codes	Absolute CapEx (Mio. €)	Proportion of CapEx (%)	Climate change mitigation (%)	Climate change adaptation (%)	Water marine resources (%)	Circular economy (%)	Pollution (%)	Biodiversity and ecosystems (%)	Climate change mitigation (Y/N)	Climate change adaptation (Y/N)	Water marine resources (Y/N)	Circular economy (Y/N)	Pollution (Y/N)	Biodiversity and ecosystems (Y/N)	Minimum safeguards (Y/N)	Taxonomy-aligned proportion of CapEx year N (%)	Taxonomy-aligned proportion of CapEx year N-1 (%)	Category (enabling activity) (E)	Category (transitional activity) (T)
A. Taxonomy-eligible activities																				
A.1 Environmentally sustainable activities (Taxonomy-aligned)																				
Close to market research, development and innovation	9.1	7	2	100	0	-	-	-	-		Y	Y	Y	Y	Y	Y	2		E	
CapEx of environmentally sustainable activities (Taxonomy-aligned) (A.1)		**7**	**2**	**100**	**0**	**-**	**-**	**-**	**-**								**2**			
A.2 Taxonomy-eligible but not environmentally sustainable activities (not Taxonomy-aligned activities)																				
Manufacture of other low carbon technologies	3.6	76	17																	
Construction of new buildings	7.1	57	13																	
Renovation of existing buildings	7.2	4	1																	
Data processing, hosting and related activities	8.1	3	1																	
CapEx of Taxonomy-eligible but not environmentally sustainable activities (not Taxonomy-aligned activities) (A.2)		**139**	**31**																	
Total (A.1 + A.2)		**147**	**33**														**2**			
B. Taxonomy-non-eligible activities																				
CapEx of Taxonomy-non-eligible activities (B)		**300**	**67**																	
Total (A + B)		**447**	**100**																	

[T45] Template: Proportion of OpEx from products or services associated with Taxonomy-aligned economic activities - disclosure covering year 2022

				Substantial Contribution criteria						DNSH criteria										
Economic activities	Codes	Absolute OpEx (Mio. €)	Proportion of OpEx (%)	Climate change mitigation (%)	Climate change adaptation (%)	Water marine resources (%)	Circular economy (%)	Pollution (%)	Biodiversity and ecosystems (%)	Climate change mitigation (Y/N)	Climate change adaptation (Y/N)	Water marine resources (Y/N)	Circular economy (Y/N)	Pollution (Y/N)	Biodiversity and ecosystems (Y/N)	Minimum safeguards (Y/N)	Taxonomy-aligned proportion of OpEx year N (%)	Taxonomy-aligned proportion of OpEx year N-1 (%)	Category (enabling activity) (E)	Category (transitional activity) (T)
A. Taxonomy-eligible activities																				
A.1 Environmentally sustainable activities (Taxonomy-aligned)																				
Close to market research, development and innovation	9.1	62	25	100	0	-	-	-	-		Y	Y	Y	Y	Y	Y	25		E	
OpEx of environmentally sustainable activities (Taxonomy-aligned) (A.1)		**62**	**25**	**100**	**0**	**-**	**-**	**-**	**-**								**25**			
A.2 Taxonomy-eligible but not environmental sustainable activities (not Taxonomy-aligned activities)																				
Manufacture of other low carbon technologies	3.6	51	20																	
Renovation of existing buildings	7.2	5	2																	
Acquisition and ownership of buildings	7.7	13	5																	
OpEx of Taxonomy-eligible but not environmentally sustainable activities (not Taxonomy-aligned activities) (A.2)		**69**	**28**																	
Total (A.1 + A.2)		**131**	**52**														**25**			
B. Taxonomy-non-eligible activities																				
OpEx of Taxonomy-non-eligible activities (B)		**119**	**48**																	
Total (A + B)		**250**	**100**																	

Voluntary disclosure in accordance with Platform on Sustainable Finance: TECHNICAL WORKING GROUP PART B – Annex: Technical Screening Criteria

Key performance indicators (KPIs)

[T46] Voluntary information on EU-Taxonomy

in percent	Taxonomy aligned	Taxonomy eligible, but not aligned	Taxonomy non-eligible
Turnover	32	61	7
CapEx	19	59	22
OpEx	49	35	16

The voluntary disclosures are based on the same accounting and valuation policies as the mandatory disclosures. Alongside the definitive requirements published in Annex 1 (contributes substantially to climate change mitigation) and Annex II (contributes substantially to climate change adaptation) to Delegated Regulation 2021/2139 to the Taxonomy Regulation, these include aviation-specific disclosures based on the report of the Platform on Sustainable Finance: TECHNICAL WORKING GROUP PART B – Annex: Technical Screening Criteria.

Turnover KPI

Economic activity "7.2 Manufacturing of aircraft" was identified as the main turnover-generating economic activity of the MTU Group within the meaning of the EU Taxonomy (TECHNICAL WORKING GROUP PART B – Annex: Technical Screening Criteria). The description of this activity includes the turnover generated by MTU through the manufacture, maintenance and repair of engine technologies for the aircraft industry. Together with the leasing of engine technologies ("7.3 Leasing of aircraft") and the overhaul and subsequent sale of aircraft technologies (2.10 Repair, refurbishment and remanufacturing, and sale of spare parts), this results in taxonomy-aligned turnover of €4,928 million.

Only the portion of taxonomy-eligible turnover in accordance with activities "7.2 Manufacturing of aircraft" that leads to higher efficiency and emissions reduction in aviation and thus contributes substantially to the climate change mitigation objective is included in the numerator of the taxonomy-aligned KPI. As evidence, the report currently provides for external certification or alternative declarations of corresponding CO_2 reductions. Since the detailed specifications of the Regulation have not yet been finalized, such external documents are not currently available to MTU. For the 2022 fiscal year, evidence was therefore based on technical documentation of the CO_2 reductions analogously to the current proposals for technical screening criteria set out in the report of the Platform on Sustainable Finance: TECHNICAL WORKING GROUP PART B – Annex: Technical Screening Criteria, ensuring consistency with the definition used for allocation to activity "3.6 Manufacture of other low carbon technologies."

Compared with the mandatory disclosures, this results in higher KPIs for both taxonomy eligibility and taxonomy alignment. This is because the voluntary disclosures take into account economic activities that explicitly relate to the aircraft industry and thus allow application of relevant criteria. In particular, taxonomy eligibility is increased by including maintenance, repair and leasing of engines. Taxonomy alignment is also based on evidence of CO_2 reductions and not on the application of general life cycle assessments based on the general ISO standard.

Based on this evaluation, MTU derives taxonomy-aligned turnover of €1,698 million for the period under review.

CapEx KPI

Taking the extended framework for relevant economic activities as a basis, the proportion of taxonomy-eligible and taxonomy-aligned CapEx increases to 78 % / 19 %. This includes, in particular, capital expenditures at locations where the corresponding maintenance and repair activities are performed.

OpEx KPI

Using the additional aviation-specific economic activities, research and development expenses also have an impact on the OpEx KPI. On this basis, the taxonomy-eligible and taxonomy-aligned capital expenditures at 84% / 49% of total capital expenditures.

The information presented is based on the current publications of the Platform on Sustainable Development. MTU expects that there will be further significant publications in the upcoming fiscal year. These will serve as a basis for reporting next year and may result in differences in the disclosures, depending on regulatory changes.

Corporate governance statement

The corporate governance statement forms part of the combined management report of the MTU Group and MTU Aero Engines AG. In accordance with Section 317 (2) sentence 6 of the German Commercial Code (HGB), auditing of the disclosures in accordance with Sections 289f and 315d of the German Commercial Code (HGB) is limited to determining whether the disclosures have been made.

Declaration of conformity with the German Corporate Governance Code by the Executive Board and Supervisory Board of MTU Aero Engines AG, in accordance with Section 161 of the German Stock Corporation Act (AktG)

The Executive Board and the Supervisory Board of MTU Aero Engines AG declare that the recommendations of the Government Commission on the German Corporate Governance Code, as published in the amended version of April 28, 2022, by the Federal Ministry of Justice in the official section of the Federal Gazette, have been and are being complied with in their entirety.

Munich, December 2022

On behalf of the Executive Board

Reiner Winkler
CEO

Lars Wagner
Chief Operating Officer

On behalf of the Supervisory Board

Gordon Riske
Chairman

The declaration of conformity is published on MTU's website at *Investor Relations > Corporate Governance > Compliance Statement.* In addition, MTU observes all suggestions made in the German Corporate Governance Code.

Responsible corporate management

Responsible corporate management is very important to MTU Aero Engines AG. The company therefore complies with all the recommendations of the German Corporate Governance Code (GCGC). The term "corporate governance" stands for the management and oversight of a company in accordance with the principles of responsibility and long-term value creation. MTU sees good corporate governance as a natural responsibility that embraces every area of the company. That comprises mutual trust and efficient collaboration between the Executive Board and the Supervisory Board, respect for the shareholders' interests and open and transparent communication with all stakeholders. As a company with global operations, MTU acts in compliance with the relevant national and international standards. In Germany, where the company has its headquarters, these standards are laid down principally in the Stock Corporation Act (AktG), the Codetermination Act (MitbestG) and the GCGC.

The Government Commission on the German Corporate Governance Code concluded a new version of the GCGC on April 28, 2022, and submitted it to the Federal Ministry of Justice and Consumer Protection for review and publication. The GCGC was published in the Federal Gazette on June 27, 2022 and therefore came into effect.

The Executive Board and Supervisory Board closely examined the GCCG during the past fiscal year. This report has been compiled in compliance with the applicable version of the GCGC. A full description of management practices that extend beyond statutory requirements is also provided in this section of the Annual Report.

Corporate management

Accepting responsibility – not only for its products and processes, employees, customers and partners, but in equal measure for the environment and society as a whole – forms an integral part of MTU's corporate culture. Alongside long-term business targets, its corporate strategy therefore gives appropriate consideration to ecological and social objectives. MTU is committed to sustainable development; its contribution goes beyond the statutory requirements. The principal focus areas of MTU's social commitment are environmental protection, human resources policy, and community outreach projects in the neighborhoods of its sites. These commitments are publicly documented on the MTU website at *www.mtu.de under Company > Corporate Responsibility.*

The company has a Code of Conduct, which has to be observed by all employees. The Code of Conduct can be downloaded from the company's *website at www.mtu.de under Company > Compliance > Policies.*

MTU attaches great importance to maintaining an open, ongoing dialogue with its target groups. The company communicates with these groups via many channels, including the intranet and internet, social media, brochures, employee and customer magazines as well as at events. The aim is to generate broad public acceptance.

MTU insists on the finest quality for its products and services. Compliance with quality standards is verified by the relevant authorities and through internal and external audits. The quality standards are published on the *MTU website under Engines > Quality.*

Trust-based cooperation among governing bodies

MTU is a stock corporation organized under German law. Its governing bodies are the Executive Board, the Supervisory Board and the Annual General Meeting. The close cooperation between the Executive Board and the Supervisory Board is based on trust and on intensive, ongoing sharing of information. The Annual General Meeting, in particular, offers shareholders the opportunity to put questions to MTU executives and to exercise their voting rights.

Working procedures of the Executive Board

The goal of the Executive Board in managing MTU is to create, on its own responsibility and in the company's interest, sustainable added value, taking into account the interests of its shareholders, employees and other stakeholders. The Executive Board works as a team, with its members bearing joint responsibility. The members of the Executive Board regularly discuss important actions and events within their respective remits. Their differing qualifications and professional experience are complementary. The company's Executive Board consisted of four members in 2022.

The Supervisory Board is briefed by the Executive Board in a regular, timely and comprehensive manner on the situation of the company, especially in thematically specific meetings of the Supervisory Board and Audit Committee at intervals throughout the fiscal year. The meetings address the company's strategy, the status of planning, the achievement of targets, the company's risk situation and its risk management activities. The Executive Board coordinates decisions of a strategic nature with the Supervisory Board, ensures that such decisions are implemented and discusses the progress made. To ensure the flow of information on the company's results of operations, financial position and net assets, the Executive Board has set up a process in which the Supervisory Board receives written reports on a monthly basis. Any deviations from the planned operational performance are explained in detail to the Supervisory Board. Furthermore, the Chairman of the Supervisory Board is briefed regularly and in person on the company's current situation, significant business transactions and important pending decisions.

The Executive Board also receives regular reports on compliance, i.e., on the measures taken to comply with laws and regulations as well as with company guidelines.

Material decisions by the Executive Board, especially those concerning the budget, require the approval of the Supervisory Board. The Supervisory Board provides information on its work in the *"Report of the Supervisory Board"* in this Annual Report. The Executive Board's rules of procedure, along with the list of transactions by MTU Aero Engines AG requiring Supervisory Board approval, can be viewed on the company's website at *www.mtu.de under Investor Relations > Corporate Governance > Articles of Association.*

In line with the recommendation of the GCGC, the Supervisory Board has set an age limit for the members of the Executive Board. Appointment or extension of the appointment to the Executive Board is only possible up until the age of 65.

The new German Act Implementing the Second Shareholder Rights' Directive (ARUG II) came into force in 2020. It contains material changes in the requirements for compensation of the Executive Board. The German Corporate Governance Code also contains recommendations on Executive Board remuneration. The corresponding new remuneration system was adopted in October 2020. All Executive Board members have agreed to it. The new remuneration system was presented to the Annual General Meeting for approval in 2021 and a large majority voted in favor of it. The remuneration of the Executive Board for the 2022 fiscal year can be found in the *section headed "Management compensation report"* and on MTU's website at *Investor Relations > Corporate Governance > Management compensation report 2022*.

Working procedures of the Supervisory Board

In line with statutory requirements, the Supervisory Board comprises six shareholder representatives and six employee representatives. The Supervisory Board appoints the Executive Board and monitors and advises it in the management of the company's business. In this respect, in 2010 the Supervisory Board resolved as a matter of principle to appoint new members to the

Executive Board for a term of three years. Key corporate decisions require the approval of the Supervisory Board. All Supervisory Board members are qualified for these tasks and perform their duties properly.

All members of the Supervisory Board make sure that they have sufficient time to perform their tasks. The statutory limits on the number of mandates and the upper limit of two supervisory board mandates for members of the executive board of a publicly listed company and five supervisory board mandates for other members recommended by the GCGC are taken into account.

In compliance with the GCGC, in 2022 only one former member of the Executive Board of MTU Aero Engines AG, namely Dr. Rainer Martens, had a seat on the Supervisory Board; the GCGC recommends no more than two. The Supervisory Board is responsible for regularly assessing the independence of its own members, especially the shareholder representatives. As a matter of principle, it considers the employee representatives to be independent. It considers that the Supervisory Board is independent if the majority of its members and the majority of the shareholder representatives are considered to be independent. In its present composition, this applies to all members of the Supervisory Board. It also applies to the shareholder representatives Klaus Eberhardt (member of the Supervisory Board until May 5, 2022) and Dr. Jürgen M. Geißinger who had/have been members of the Supervisory Board of MTU for more than 12 years. The period for which members have served on the Supervisory Board is published in their resumes on the company's website. Given the nature of MTU's business model and the lifecycle of its engines, which is 30 to 40 years in some cases, and the high initial capital expenditure involved, the Executive Board and the Supervisory Board consider long-serving members of the Supervisory Board to be an especially valuable asset to the company and do not take the view that they must necessarily be deemed insufficiently independent after a tenure of 12 to 15 years based on this fact alone. The Supervisory Board has set four terms of office as the maximum for membership of the Supervisory Board and considers this to be appropriate for MTU. Moreover, there are no other indications that the members of the Supervisory Board of MTU lack independence. In this way, independent advice and oversight of the Executive Board is ensured by both the full Supervisory Board and its committees.

The Supervisory Board's rules of procedure provide for the establishment of committees. The Supervisory Board of MTU has four committees: an Audit Committee, a Personnel Committee, a Mediation Committee and a Nomination Committee. The members of the Audit Committee are Dr. Joachim Rauhut (Chairman), Dr. Christine Bortenlänger, Heike Madan and Josef Mailer. The members of the Personnel Committee and the Mediation Committee are Gordon Riske (since May 5, 2022) (Chairman), Klaus Eberhardt (until May 5, 2022) and Dr. Jürgen M. Geißinger plus the employee representatives Josef Mailer, Daniele Frijia (since August 17, 2022) and Roberto Armellini (until July 31, 2022). The members of the Nomination Committee are Gordon Riske (since May 5, 2022) (Chairman)/Klaus Eberhardt (until May 5, 2022) and Dr. Jürgen M. Geißinger. The Chairman of the Audit Committee, Dr. Joachim Rauhut, has many years of professional experience in various German and foreign industrial companies, most recently as CFO of Wacker Chemic AG, Munich; as a result he has a special understanding of the areas of accounting and auditing within the meaning of Section 100 (5) AktG and therefore meets the requirements for an independent financial expert. Dr. Christine Bortenlänger, who is a member of the Audit Committee, has the qualifications set out in the same provision as an independent financial expert in the area of auditing thanks to many years as a member of the Management Board of Bayerische Börse AG and Managing Director of the public stock exchange in Munich, as well as many years of experience as a member of various supervisory boards and audit committees. Both committee members have in-depth knowledge and experience of internal control processes, in other words, risk and compliance management, the internal control system and internal auditing.

Further details can be found in the section headed "The Supervisory Board." In addition, the resumes of the Supervisory Board are published on the *company's website at www.mtu.de under About us > Supervisory Board.*

In consultation with the Executive Board, the Supervisory Board ensures long-term succession planning for appointments to the Executive Board. To this end, the Supervisory Board regularly reviews the present term of all Executive Board contracts, taking into account the age of each member, the competency profile of potential candidates and the defined diversity objective for the Executive Board.

The Supervisory Board's rules of procedure contain binding provisions for dealing with conflicts of interest. Such conflicts must be disclosed and, where appropriate, may result in termination of the member's term of office. In addition, the Supervisory Board must explicitly state such potential conflicts of interest when submitting the nominations to the Annual General Meeting. There were no conflicts of interest in the reporting period. With the exception of a consulting agreement between a Supervisory Board member and a supplier of the company, there were no consulting agreements, contracts for services or similar contractual agreements between members of the Supervisory Board and MTU Aero Engines AG or any of its subsidiaries, or with customers, suppliers, lenders or other third parties in 2022. If there are any discussions or resolutions affecting this supplier in future – this was not the case during the reporting period – the Supervisory Board member concerned will not take part in them.

The Supervisory Board has defined specific targets for its composition in a competence profile and drawn up a qualifications matrix showing the current status. Importance is attached to diversity. The competence profile forms the basis for all nominations submitted to the Annual General Meeting. It is published on MTU's website. Nominations submitted by the Supervisory Board to the Annual General Meeting take account of all objectives and also strive to comply with the competence profile for the Supervisory Board as a whole.

MTU's Supervisory Board should be made up of personalities who, in their entirety, provide a range of competences which ensure comprehensive and effective consultancy to and supervision of the Executive Board with regard to the whole gamut of MTU's business activities, including its strategy and approach to new societal and technological challenges. In the opinion of the Supervisory Board, essential elements of this range of competences should include:

- Leadership and governance in a two-tier corporate governance system
- CEO experience in publicly listed companies
- Aerospace industry
- Capital market knowledge & value creation & M&A
- Profound knowledge in financial reporting (including sustainability reporting)
- Profound knowledge in auditing of the annual accounts (including review of sustainability reporting)
- Supply chain & operations
- Risk management & compliance
- Marketing & sales
- International experience in respect to relevant markets
- Sustainability (ESG)
- Future-oriented technologies
- Digitalization & IT

[T47] Qualifications matrix for the Supervisory Board of MTU Aero Engines AG

		Gordon Riske	Josef Mailer	Dr. Christine Bortenlänger	Thomas Dautl	Daniele Frijia	Dr.-Ing. Jürgen M. Geißinger	Anita Heimerl	Heike Madan	Dr. Rainer Martens	Dr. Joachim Rauhut	Univ. Prof. Dr. Marion A. Weissenberger-Eibl	Michael Winkelmann
Professional competence	Leadership and governance in a two-tier corporate governance system	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	
	CEO experience in publicly listed companies	✔					✔						
	Aerospace industry		✔		✔		✔	✔		✔			✔
	Capital market knowledge & value creation & M&A	✔		✔			✔			✔	✔		
	Supply chain & operations		✔		✔		✔			✔		✔	
	Risk management & compliance	✔		✔			✔				✔		
	Marketing & sales			✔			✔						
	International experience in respect to relevant markets	✔					✔			✔			
	Sustainability (ESG)	✔		✔	✔	✔	✔			✔	✔	✔	
	Future-oriented technologies				✔					✔		✔	
	Digitalization & IT	✔				✔	✔				✔	✔	
Financial expertise	Expert in financial reporting (including sustainability reporting)										✔		
	Expert in auditing of the annual accounts (including review of sustainability reporting)			✔							✔		
Term of office	Initial appointment	2022	2015	2018	2008	2022	2005	2018	2016	2021	2009	2013	2020
End of term of office		2026	2023	2023	2023	2023	2023	2023	2023	2025	2024	2023	2023
Personal suitability	Independence	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Time availability	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	No overboarding	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Diversity/ internationality	Gender	M	M	F	M	M	M	F	F	M	M	F	M
	Year of birth	1957	1964	1966	1963	1981	1959	1964	1972	1961	1954	1966	1959
	Nationality	D / USA	D	D	D	D	D	D	D	D	D	D	D
	International experience	✔					✔			✔	✔	✔	

In the past financial year, directors' and officers' liability insurance was in effect for the members of MTU's Executive Board and Supervisory Board. The compensation of the members of the Executive Board and Supervisory Board is based on clear and transparent criteria, These are described in the section headed *"Management compensation report,"* and on MTU's website at *Investor Relations > Corporate Governance > Management compensation report 2022*.

The Supervisory Board regularly assesses how effectively the Supervisory Board as a whole and its committees perform their tasks. In 2022, the Supervisory Board conducted a self-assessment of the work in plenary session, with the aid of an external consultant. This comprised a questionnaire and individual talks with each Supervisory Board member and with the Executive Board. Special attention was paid to the areas of strategy, structures & processes, corporate culture, composition of the Supervisory Board, leadership and ESG. Benchmarking against a selected peer group of companies was also used. The results were discussed with the Supervisory Board at a separate workshop. They form the basis for the ongoing development of the work of the Supervisory Board and for its profile of skills and expertise.

The Audit Committee conducted a self-assessment by evaluating feedback from a questionnaire developed by an external law firm. The focal areas of this self-assessment were the tasks and organization of the committee and the skills of its members, oversight of the audit, internal auditing and the risk management system, and financial reporting. The members of the Audit Committee considered the work of the committee to be conducted efficiently and adopted some specific measures to enhance the organization of its work.

Diversity

The diversity of its employees plays a key role in MTU's success. Therefore, diversity is very important to MTU.

In the context of the German law on equal participation of women and men in leadership positions, MTU has set itself goals: In accordance with Section 111 (5) of the German Stock Corporation Act (AktG), the supervisory boards of publicly listed companies and companies that are subject to the German Codetermination Act (MitbestG) are required to set target quotas for women on their supervisory and executive boards. In addition, under Section 76 (4) of the German Stock Corporation Act (AktG) the Executive Board is required to set a target quota for women at the two management levels directly below the Executive Board.

Diversity also plays an important role in the composition of the Supervisory Board. In compliance with both the German Stock Corporation Act (AktG) and the GCGC, the supervisory boards of listed companies subject to the German Codetermination Act (MitbestG) must comprise at least 30% women and at least 30% men. The Supervisory Board has four female members: Dr. Christine Bortenlänger, Anita Heimerl, Heike Madan and Univ. Prof. Dr. Marion A. Weissenberger-Eibl. Two are employee representatives and two are shareholder representatives. The percentage of women on the Supervisory Board is therefore unchanged at 33.3%.

In addition, the Supervisory Board has set the following goal: International focus is very important for MTU as a global corporation. At least one member of the Supervisory Board should therefore meet the criterion of "internationality." It is already the case that various members of MTU's present Supervisory Board trained or have spent a large part of their professional lives abroad. The members of the Supervisory Board should continue to contribute an international perspective.

The Supervisory Board takes the above-mentioned goals into account when submitting proposals for election by the Annual General Meeting. The same applies to the Nomination Committee, which is responsible for preparing the vote of the Supervisory Board. Since the main criterion for any proposal is still the company's interest, the Supervisory Board proposes the most suitable candidates.

The Supervisory Board's rules of procedure set an age limit for members. Their terms on the Supervisory Board automatically end at the end of the Annual General Meeting following the member's 75th birthday. Moreover, a general limit of four terms of office has been set for serving on the Supervisory Board.

The Supervisory Board also places value on fostering diversity in appointments to the Executive Board. The members of the Executive Board have diverse qualifications and work experience, which contribute to their work. In accordance with the provisions of the German Stock Corporation Act (AktG) and the German Corporate Governance Code (GCGC), in 2017 the Supervisory Board set a target quota of 25% for female members of the Executive Board, to be achieved by June 30, 2022. This target had not been achieved by the reporting date because the existing appointments of four men to the Executive Board extended beyond this time horizon. Following the decision by Reiner Winkler to step down and the appointment of Dr. Silke Maurer as a member of the Executive Board with responsibility for OEM Operations and Chief Operating Officer (COO) of MTU with effect from February 1, 2023, the target of 25% female members is achieved; the Executive Board still comprises four members.

At an extraordinary meeting on September 28, 2022, the Supervisory Board appointed Dr. Silke Maurer to the company's Executive Board for a three-year term of office.

For the management levels below the Executive Board, the target set for mid-2022 was 13% female managers at MTU's German sites. As of June 30, 2022, the percentage was 12.3%. There were various reasons for this: MTU has been able to realize some of the potential effectively, but not in equal measure in all units. Furthermore, it was not possible to fill succession chains with female potentials to the extent that MTU had hoped. In recent years, various initiatives have been introduced to increase the proportion of women in management positions (mentoring, establishment of the Network of Engine Women, etc.); these should have a greater impact in the medium term. The Executive Board has set a new target quota of 15% (three women) for the first management tier below the Executive Board and 20% (18 women) for the second tier below the Executive Board by June 30, 2027.

MTU is continuing to pursue its goal of increasing the number of women on all levels. Every area of the company is called upon to work actively toward achieving this corporate objective. The measures focus on recruiting more female potentials and providing more intensive support for female employees during their careers. To this end, MTU invests extensively in the development of its female employees and is involved in mentoring programs and a variety of initiatives. In addition, MTU has an active network for women, with Lars Wagner, CEO, as its advocate, and extensive measures to improve work-life balance, including flexible working hours, support services for families, and scope for teleworking. A full description of diversity management at MTU Aero Engines AG can be found in the current *Sustainability report*.

Financial reporting

MTU prepares its consolidated financial statements and interim reports in accordance with the International Financial Reporting Standards (IFRSs). The Executive Board is responsible for this. Financial reporting comprises, in particular, the consolidated financial statements and the Group management report (including the non-financial statement). In addition, the financial reporting and the audit include sustainability reporting, together with the audit thereof. The annual financial statements of MTU Aero Engines AG are compiled in accordance with the provisions of the German Commercial Code (HGB). An internal control system, coupled with the application of uniform accounting policies, ensures that the results of operations, financial position, net assets and cash flows of all Group companies are accurately presented. In addition, MTU has a differentiated system in place to identify and monitor business and financial risks.

Risk management and control system

The Executive Board is responsible for ensuring that an appropriate risk management and control system is in place. This system is described in the section headed *"Internal control and risk management system."* The Executive Board reports to the Supervisory Board in a regular and timely manner on existing opportunities and risks, and how they are developing. The Audit Committee of the Supervisory Board discusses risk management. In accordance with Section 107 (3) of the German Stock Corporation Act (AktG), the Audit Committee is explicitly responsible for monitoring the effectiveness of the risk management system, the internal control and auditing systems, the financial reporting process and the audit of the financial statements, and in particular, for assessing the auditors' independence.

Compliance

The corporate culture at MTU is characterized by trust and mutual respect. The observance of legal and ethical rules and principles plays a central role in this respect. These and other aspects of compliance, such as the responsible handling of insider information, are documented in a Code of Conduct, which was revised, agreed and introduced jointly by the Executive Board and the Group Works Council in 2020. This Code of Conduct embodies MTU's corporate culture and reflects its resolve to comply strictly with the relevant laws and internal regulations. It is a Group-wide guide to ethical business relations.

Nevertheless, the risk can never be entirely ruled out that unauthorized behavior of isolated individuals might lead to contravention of the law. MTU does everything in its power to minimize this risk as far as possible, and is committed to preventing acts of misconduct, such as corruption, in the first place through corresponding rules and regular and targeted training, and to uncovering and pursuing any such acts.

Compliance is an important aspect of all management functions at MTU. For example, all managers must check that every member of their staff is familiar with the Code of Conduct and abides by its rules. Reinforcement is provided by internal training.

The central contact for all compliance-related matters in the company is the Compliance Officer, who is a member of the corporate management and reports directly to the Executive Board. The duties of the Compliance Officer focus, first and foremost, on preventing corruption and failure to comply with cartel and insider regulations. The Compliance Officer advises the Executive Board, managers and the managing directors of the individual sites. He draws up training concepts and guidelines and makes recommendations on compliance checks. In addition, the Compliance Officer leads investigations into cases of suspected non-compliance and coordinates the measures taken. Furthermore, he acts as ombudsman. Both employees and third parties such as customers and suppliers can report suspected non-compliance issues to the Compliance Officer confidentially. As well as contacting him personally, they have access to iTrust, a web-based whistleblower system that also allows anonymous reports.

Reports on the Compliance Officer's activities are presented to the Supervisory Board's Audit Committee. The Audit Committee then informs the plenary meetings of the Supervisory Board via a summary of its own meetings. It supervises the Executive Board's compliance activities, including monitoring the measures and training programs implemented by the Compliance Officer and proposing revisions to the compliance rules.

Extensive information, Annual General Meeting, Directors' Dealings

In keeping with the principles of good corporate governance, MTU continually provides extensive and timely information on the company's activities and any major developments in its business situation for shareholders, shareholder associations, financial analysts, the media and other interested parties. MTU strives to ensure that all stakeholders are kept informed in equal measure. Within reason, the Chairman of the Supervisory Board is also prepared to meet with investors to talk about topics specific to the Supervisory Board. The company publishes an extensive range of information on its website at *www.mtu.de*. It publishes quarterly information on its business activities. Any new developments likely to have a significant impact on the MTU share price are disclosed in the form of ad-hoc releases in accordance with statutory requirements.

Information is also posted on the MTU website whenever members of the Executive Board or Supervisory Board or related persons have purchased or sold MTU shares, debt instruments or share-based derivatives. Section 19 of the European Market Abuse Regulation stipulates that these persons must disclose such transactions if their value in a single calendar year reaches or exceeds €20,000. The total number of shares in MTU Aero Engines AG, Munich, held by members of the company's Executive Board and Supervisory Board as of December 31, 2022, was less than 1% of the company's capital stock.

In the interests of the health of shareholders and employees of MTU, the Executive Board decided, with the consent of the Supervisory Board, to hold the Annual General Meetings in 2020, 2021 and 2022 remotely, without physical attendance by shareholders or their proxies, as permitted by the German Act Concerning Measures Under the Law of Companies, Cooperative Societies, Associations, Foundations and Commonhold Property to Combat the Effects of the Covid-19 Pandemic (GesRuaCOVBekG) and the legal ordinance issued by the Federal Ministry of Justice and Consumer Protection, which came into force on October 29, 2020. At an extraordinary session on September 7, 2021, the German Bundestag resolved to further extend the Covid-19 emergency legislation. Joint stock companies were therefore permitted to hold their Annual General Meeting virtually until August 31, 2022. In view of the ongoing coronavirus pandemic and the spread of the highly infectious omicron mutation of the virus, MTU decided to that the 2022 Annual General Meeting would also be held virtually. In addition, given the highly international shareholder structure, MTU considers a modern format for its Annual General Meeting to be appropriate as it enables global participation of shareholders without the need to travel or observe contact restrictions and therefore enables them to exercise their rights as shareholders and to follow the entire Annual General Meeting, including the general discussion, as a live video and audio stream. In 2022, shareholders were able to email their questions to the company at the latest one day before the Annual General Meeting.

The company supports the exercise of shareholder rights and proxy voting by its shareholders in part by providing voting representatives who exercise voting rights in accordance with instructions received from individual shareholders. Shareholders also have the option of absentee voting. Shareholders can use electronic means to authorize proxies and provide voting instructions to the company's voting representatives up to the beginning of the Annual General Meeting.

Legislation on the introduction of virtual annual general meetings at joint stock companies came into force on July 27, 2022. Joint stock companies can now choose whether a virtual format is preferable to an in-person meeting or whether a hybrid format is an alternative. MTU has decided to hold its Annual General Meeting in 2023 as a virtual Annual General Meeting.

Consolidated financial statements

Consolidated income statement

[T48] Consolidated income statement

in € million	(Note)	2022	2021
Revenue	**(1.)**	**5,330**	**4,188**
Cost of goods sold	(2.)	–4,475	–3,601
Gross profit		**855**	**586**
Research and development expenses	(3.)	–106	–83
Selling expenses	(4.)	–143	–124
General administrative expenses	(5.)	–111	–92
Other operating income	(6.)	23	41
Other operating expenses	(6.)	–72	–57
Profit/loss of companies accounted for using the equity method	(7.)	60	81
Profit/loss of equity investments	(7.)	3	2
Earnings before interest and taxes (EBIT)		**508**	**355**
Net interest income/expense	(8.)	–22	–29
Other financial income/expense	(9.)	–23	–10
Net financial income/expense		**–45**	**–39**
Earnings before income taxes		**463**	**315**
Income taxes	(10.)	–130	–84
Net income		**333**	**231**
thereof:			
owners of MTU Aero Engines AG		331	222
non-controlling interests		2	9
Earnings per share (in €)			
Basic (EPS)	(11.)	6.21	4.17
Diluted (DEPS)	(11.)	6.06	4.09

Consolidated statement of comprehensive income

[T49] Consolidated statement of comprehensive income

in € million	(Note)	2022	2021
Net income		**333**	**231**
Translation differences arising from the financial statements of foreign entities		16	62
Financial instruments designated as cash flow hedges		–34	–106
Items that may subsequently be recycled to profit or loss		–18	–44
Actuarial gains/losses on pension obligations and plan assets		151	26
Changes in the fair value of equity investments			–6
Items that will not be recycled to profit or loss		151	20
Other comprehensive income after taxes	**(24.)**	**134**	**–24**
Total comprehensive income		**466**	**207**
thereof:			
owners of MTU Aero Engines AG		461	192
non-controlling interests		6	15

Consolidated balance sheet – assets

[T50] Assets

in € million	(Note)	Dec. 31, 2022	Dec. 31, 2021
Non-current assets			
Intangible assets	(14.)	1,151	1,128
Property, plant and equipment	(15.)	1,384	1,251
Financial assets accounted for using the equity method	(16.)	628	611
Other financial assets	(16.)	100	72
Acquired program assets, development work and other assets	(17.)	800	898
Deferred taxes	(34.)	84	83
Total non-current assets		**4,146**	**4,043**
Current assets			
Inventories	(19.)	1,514	1,380
Trade receivables	(20.)	1,110	946
Contract assets	(21.)	1,137	897
Income tax receivables	(22.)	34	89
Other financial assets	(16.)	410	177
Other assets	(17.)	56	50
Cash and cash equivalents	(23.)	823	722
Total current assets		**5,085**	**4,260**
Total assets		**9,230**	**8,304**

Consolidated balance sheet – equity and liabilities

[T51] Total equity and liabilities

in € million	(Note)	Dec. 31, 2022	Dec. 31, 2021
Equity	**(24.)**		
Subscribed capital		53	53
Capital reserves		531	529
Retained earnings		2,680	2,461
Treasury shares		-13	-17
Accumulated other comprehensive income		-216	-345
Owners of MTU Aero Engines AG		**3,034**	**2,681**
Non-controlling interests		72	79
Total equity		**3,107**	**2,760**
Non-current liabilities			
Pension provisions	(25.)	661	905
Other provisions	(27.)	53	63
Financial liabilities	(28.)	1,610	1,437
Contract liabilities	(30.)	5	7
Other liabilities	(32.)	14	9
Deferred taxes	(34.)	0	3
Total non-current liabilities		**2,343**	**2,424**
Current liabilities			
Pension provisions	(25.)	46	44
Income tax liabilities	(26.)	70	9
Other provisions	(27.)	217	173
Refund liabilities	(31.)	2,041	1,758
Financial liabilities	(28.)	319	226
Trade payables	(29.)	284	165
Contract liabilities	(30.)	708	692
Other liabilities	(32.)	95	53
Total current liabilities		**3,780**	**3,119**
Total equity and liabilities		**9,230**	**8,304**

Consolidated statement of changes in equity

[T52] Consolidated statement of changes in equity

in € million	Subscribed capital	Capital reserves	Retained earnings	Treasury shares	Accumulated other comprehensive income				**Owners of MTU Aero Engines AG**	Non-controlling interests	**Total equity**
					Translation differences arising from the financial statements of foreign entities	Changes in the fair value of equity investments	Actuarial gains/losses[1]	Financial instruments designated as cash flow hedges			
Carrying amount as of Jan. 1, 2021	**53**	**508**	**2,298**	**–2**	**–32**	**13**	**–348**	**62**	**2,553**	**82**	**2,635**
Net income			222						222	9	231
Other comprehensive income					55	–6	26	–106	–30	7	–24
Total comprehensive income			**222**		**55**	**–6**	**26**	**–106**	**192**	**15**	**207**
Dividend payment			–67						–67	–13	–80
Changes in equity due to portfolio transactions[2]			7		–4	–7			–4	–5	–9
Convertible bond 2016	0	12							13		13
Restricted Stock Plan		2		0					2		2
Employee stock option program (MAP)		7		17					23		23
Share buy-back				–31					–31		–31
Carrying amount as of Dec. 31, 2021	**53**	**529**	**2,461**	**–17**	**19**	**0**	**–321**	**–43**	**2,681**	**79**	**2,760**
Net income			331						331	2	333
Other comprehensive income					12	0	151	–34	129	4	134
Total comprehensive income			**331**		**12**	**0**	**151**	**–34**	**461**	**6**	**466**
Dividend payment			–112						–112	–12	–124
Convertible bond 2016	0	2							2		2
Restricted Stock Plan		–1		3					3		3
Carrying amount as of Dec. 31, 2022	**53**	**531**	**2,680**	**–13**	**32**	**0**	**–170**	**–77**	**3,034**	**72**	**3,107**

[1] Refers to pension obligations and plan assets

[2] Relates to the sale of Vericor Power Systems LLC, the acquisition of the remaining 20% of MTU Maintenance Lease Services B.V., and the sale of the 10% equity investment in SMBC Aero Engine Lease B.V.

Consolidated cash flow statement

[T53] Consolidated cash flow statement

in € million	(Note)	2022	2021
Operating activities			
Net income		333	231
Non-cash amortization (including impairment) of acquired losses on capitalized program assets and acquired development work		109	92
Amortization, depreciation, write-ups and impairment of other non-current assets		247	265
Profit/loss of companies accounted for using the equity method	(7.)	-60	-81
Profit/loss of equity investments	(7.)	-3	-2
Gains/losses on the disposal of assets		-0	-14
Change in pension provisions	(25.)	-19	-22
Change in other provisions	(27.)	34	40
Change in refund liabilities (not included in working capital)	(31.)	204	-96
Change in working capital		-293	50
Other non-cash items		43	42
Net interest income/expense	(8.)	22	29
Interest paid		-26	-29
Interest received		7	1
Dividends received		76	85
Income taxes	(10.)	130	84
Income taxes paid		-76	-107
Cash flow from operating activities		**728**	**567**
Investing activities			
Capital expenditure on:			
Intangible assets	(14.)	-59	-82
Property, plant and equipment	(15.)	-322	-262
Financial assets	(16.)	-51	-42
Acquired program assets and development work		-21	-23
Proceeds from disposal of:			
intangible assets/property, plant and equipment	(14.) / (15.)	16	21
consolidated subsidiaries		14	32
other financial assets	(16.)	23	10
Cash flow from investing activities		**-400**	**-345**
Financing activities			
Cash outflow from other bonds and notes	(28.)	-0	-100
Settlement of lease liabilities	(28.)	-64	-34
Settlement of purchase price liabilities for stakes in programs		-36	-25
Repayment of other financial liabilities	(28.)	-0	-30
Dividend paid to shareholders of MTU AG/ to non-controlling interests		-124	-80
Capital increase		0	
Sale of treasury shares in connection with the employee stock option program (MAP) / Restricted Stock Plan (RSP)	(28.)	0	23
Purchase of treasury shares in connection with the employee stock option program (MAP)/ Restricted stock Plan (RSP)		0	-31
Cash flow from financing activities		**-224**	**-276**
Net change in cash and cash equivalents during the reporting period		**104**	**-54**
Effect of translation differences on cash and cash equivalents		-3	3
Cash and cash equivalents at beginning of period (Jan. 1)		722	773
Cash and cash equivalents as of Dec. 31		**823**	**722**

Consolidated segment report

[T54] Consolidated segment report

in € million	Commercial and military engine business (OEM) 2022	Commercial and military engine business (OEM) 2021	Commercial maintenance business (MRO) 2022	Commercial maintenance business (MRO) 2021	Total reportable segments 2022	Total reportable segments 2021	Consolidation/ reconciliation 2022	Consolidation/ reconciliation 2021	MTU Group 2022	MTU Group 2021
External revenue	1,766	1,494	3,564	2,693	5,330	4,188			5,330	4,188
Revenue from intersegment sales	65	53	52	48	117	101	-117	-101		
Total revenue	**1,831**	**1,547**	**3,616**	**2,741**	**5,447**	**4,289**	**-117**	**-101**	**5,330**	**4,188**
Gross profit	**500**	**351**	**357**	**237**	**857**	**588**	**-2**	**-1**	**855**	**586**
Amortization	45	41	9	7	54	47			54	47
Non-cash amortization of capitalized program assets and acquired development work	47	46			47	46			47	46
Depreciation	113	115	77	66	190	181			190	181
Impairment losses	65	83	1		66	83			66	83
Amortization/value adjustments/ depreciation/impairment losses	**271**	**285**	**87**	**72**	**357**	**357**			**357**	**357**
Earnings before interest and taxes (EBIT)	**268**	**209**	**239**	**146**	**507**	**355**	**0**	**-0**	**508**	**355**
thereof: special item depreciation/ amortization effect of purchase price allocation	18	18	2	2	20	21			20	21
thereof: special item effects from increase in the stake in IAE-V2500	23	23			23	23			23	23
thereof: special item portfolio transactions		-13				-13				-13
thereof: special item impairment losses (Russia/ Ukraine war)	53		27		81				81	
thereof: special item impairment losses on program assets	24	83			24	83			24	83
Adjusted earnings before interest and taxes (adjusted EBIT)	**387**	**320**	**268**	**149**	**655**	**468**	**0**	**-0**	**655**	**468**
Profit/loss of companies accounted for using the equity method	9	44	51	37	60	81			60	81
Carrying amount of companies accounted for using the equity method	311	339	317	272	628	611			628	611
Assets	**7,793**	**7,189**	**3,056**	**2,515**	**10,849**	**9,704**	**-1,619**	**-1,400**	**9,230**	**8,304**
Liabilities	**5,247**	**4,729**	**2,158**	**1,877**	**7,406**	**6,606**	**-1,282**	**-1,063**	**6,124**	**5,543**
Material non-cash items	**8**	**36**	**34**	**5**	**43**	**42**			**43**	**42**
Capital expenditure:										
Intangible assets	58	54	2	29	60	83			60	83
Property, plant and equipment	157	148	230	153	387	301			387	301
Capitalized program assets and acquired development work	26	18			26	18			26	18
Total capital expenditure	**240**	**219**	**232**	**183**	**472**	**402**			**472**	**402**
Key segment data:										
EBIT (in % of revenue)	14.7	13.5	6.6	5.3	9.3	8.3			9.5	8.5
Adjusted EBIT (in % of revenue)	21.1	20.7	7.4	5.4	12.0	10.9			12.3	11.2

The key indicator used by management to measure the operating performance of each segment is adjusted earnings before interest and taxes (adjusted EBIT).

Intersegment sales are transacted at arm's length at standard market terms and invoiced in the same way as transactions with external third parties. The material non-cash items in the reporting period included gains arising from foreign currency translation.

In the reporting period, two major customers each accounted for more than 10% of total Group revenue. Business with the largest customer generated revenue of €1,335 million (previous year: €1,227 million) and with the second-largest customer €758 million (previous year: €482 million).

The revenue of the largest customers stemmed from both segments.

For more information on segment reporting, please see Section V. *"Segment information."*

I. Accounting principles and policies

Principles and methods

The business activities of MTU Aero Engines AG, Munich, Germany, and its consolidated companies (subsequently referred to as the Group, Group companies or MTU) extend over the entire lifecycle of an engine program – from development, structural design, testing and manufacturing of new commercial and military engines and spare parts through to the maintenance, repair and overhaul of commercial and military engines. MTU divides its activities into two operating segments: the commercial and military engine business (OEM) and the commercial maintenance business (MRO).

MTU's commercial and military engine business (OEM business) covers the development and manufacturing of modules, components and spare parts for engine programs, and in some cases final assembly. The military engine business additionally includes the provision of maintenance services. The MRO segment consists of the commercial maintenance business (MRO business), which covers all activities relating to the maintenance, repair and overhaul of commercial engines as well as associated services.

The parent company, MTU Aero Engines AG, with registered office at Dachauer Strasse 665, 80995 Munich, Germany, is registered under reference HRB 157 206 in the commercial registry of the district court of Munich.

The consolidated financial statements were approved for publication by the Executive Board of MTU Aero Engines AG, Munich, on March 14, 2023.

MTU's consolidated financial statements were prepared in accordance with International Financial Reporting Standards (IFRSs) as applicable in the European Union (EU), and the supplementary requirements of Section 315e (1) of the German Commercial Code (HGB). All IFRSs issued by the International Accounting Standards Board (IASB) that were in effect at the time these consolidated financial statements were prepared and were applied by MTU were endorsed by the European Commission for use in the EU.

The consolidated financial statements have been prepared on a going concern basis. This management assessment is based on the multi-year business planning, taking into account the proven past achievement of the plans and the complementary system for the early identification of risks. Furthermore, the management assessment is supported by the company's positive earnings capability in 2022, an order backlog covering several years and sound financing as a result of high levels of liquidity.

The consolidated financial statements for the period ended December 31, 2022, and the combined management report for fiscal year 2022 were prepared in accordance with Section 315e (1) of the German Commercial Code (HGB) and published in the Federal Gazette (Bundesanzeiger).

The fiscal year is identical to the calendar year. Comparative figures for the previous year are included in the consolidated financial statements.

In the presentation of the balance sheet, a distinction is made between non-current and current assets and liabilities. A more detailed maturity analysis of certain items is provided in the Notes to the consolidated financial statements. An asset or liability is classified as current if:

- it is held primarily for trading purposes,
- it is expected to be realized or repaid respectively within 12 months of the reporting date,
- it is cash or a cash equivalent, unless the exchange or utilization of the asset for the purpose of fulfilling an obligation is restricted for a period of at least 12 months after the reporting date, or
- it is a net contract asset or liability that will be realized during MTU's normal business cycle, even if the period for realization may exceed 12 months.

The income statement is prepared using the cost-of-sales method in which revenue is balanced against the expenses incurred to generate it, and expenses are classified by function: production, research and development, distribution, and general administration. The consolidated financial statements are denominated in euros. All amounts are stated in millions of euros (€ million), unless otherwise specified. Due to rounding, some of the rounded figures presented in these consolidated financial statements may not correspond exactly to the sum of the individual figures, and it may not be possible to calculate some of the individual percentages from the rounded absolute figures presented. "0" represents amounts of between zero and half a million euros, while "–0" represents amounts between zero and minus half a million euros. Amounts of exactly €0.00 are shown by an empty field in tables.

Accounting standards, interpretations, and amended standards and interpretations applied for the first time in fiscal year 2022

The following new and amended accounting standards and interpretations were applied for the first time in these consolidated financial statements:

[T55] New and amended standards

Standard	Title
IFRS 3	Amendments: Reference to the Conceptual Framework
IAS 16	Amendments: Proceeds Before Intended Use
IAS 37	Amendments: Onerous Contracts – Cost of Fulfilling a Contract
Annual Improvements to IFRS Standards 2018–2020	Amendments: to IFRS 1, IFRS 9, IFRS 16 and IAS 41

Application of these standards did not result in any significant changes to the MTU Group's financial reporting.

Accounting standards, interpretations, and amended standards and interpretations issued but not yet applied

The following new and amended standards and interpretations have been issued by the IASB but were not yet effective for annual periods beginning on January 1, 2022:

[T56] Accounting standards and interpretations not yet applied

Standard	Title
IFRS 16	Amendments: Lease Liability in a Sale and Leaseback [2) 3)]
IFRS 17	Amendments: Application of IFRS 17 and IFRS 9 – Comparative Information [1)]
IFRS 17	Insurance Contracts [1)]
IAS 1	Amendments: Disclosure of Accounting Policies [1)]
IAS 1	Amendments: Classification of Liabilities as Current or Non-current [2) 3)]
IAS 1	Amendments: Non-current Liabilities with Covenants [2) 3)]
IAS 8	Amendments: Definition of Accounting Estimates [1)]
IAS 12	Amendments: Deferred Tax related to Assets and Liabilities arising from a Single Transaction [1)]

[1)] Effective for annual periods beginning on or after January 1, 2023.
[2)] Effective for annual periods beginning on or after January 1, 2024.
[3)] Still awaiting EU endorsement.

MTU does not apply standards, interpretations and amendments before the effective date.

In view of the MTU Group's current business model, the aforementioned standards are not expected to have a material impact on MTU's financial reporting in future reporting periods. With regard to IFRS 17, which has to be applied from January 1, 2023, a review has shown that none of the existing contracts with customers are by nature insurance contracts; their purpose is the provision of products and services by MTU.

Application of Section 264 (3) of the German Commercial Code (HGB)

MTU Maintenance Hannover GmbH, Langenhagen, Germany, and MTU Maintenance Berlin-Brandenburg GmbH, Ludwigsfelde, Germany, are consolidated affiliated companies of MTU Aero Engines AG, Munich. These companies apply the exemption in Section 264 (3) of the German Commercial Code (HGB).

Consolidated group

As of December 31, 2022, the Group including MTU Aero Engines AG, Munich, comprised 33 companies. These are presented in detail in the list of major shareholdings in Note 38 "Related party disclosures".

Changes in the consolidated group

In the reporting period, the number of Group companies and equity investments in associates and joint ventures included in the consolidated financial statements changed as follows:

[T57] Consolidated group

	Germany	International	Total
Shareholdings as of Dec. 31, 2020	**12**	**22**	**34**
Additions 2021	1	1	2
Disposals 2021		–2	–2
Shareholdings as of Dec. 31, 2021	**13**	**21**	**34**
Additions 2022			
Disposals 2022	–1		–1
Shareholdings as of Dec. 31, 2022	**12**	**21**	**33**

The disposal relates to MTU Maintenance Coating Services GmbH, Ludwigsfelde, which was merged with MTU Maintenance Berlin-Brandenburg GmbH, Ludwigsfelde, on January 1, 2022.

Subsidiaries

The consolidated financial statements of MTU Aero Engines AG, Munich, include all material companies in which MTU Aero Engines AG, Munich, has a controlling interest as defined by IFRS 10, in other words entities in which MTU, as the investor, is exposed, or has rights, to variable returns from its involvement with the investee and has the ability to affect those returns through its power over the investee. There were no changes in the classification of these controlling interests during the reporting period.

Associates

Associates are companies over which MTU exercises significant influence in accordance with IAS 28 and which are neither subsidiaries nor joint ventures. The equity investments in these entities, over whose financial and operating policies MTU directly or indirectly exercises significant influence, are accounted for using the equity method, or at fair value if the effects of their consolidation under the equity method would be immaterial to the presentation of MTU's net assets, financial position and results of operations. There were no changes in the classification of these equity investments during the reporting period. MTU holds an 18% share in the voting rights of IAE International Aero Engines LLC, East Hartford, CT, USA, and of PW1100G-JM Engine Leasing LLC, East Hartford, CT, USA. The underlying agreements grant MTU significant influence over the management of these investees, as well as information and consultation rights, thus justifying their classification as associates from MTU's perspective.

Joint ventures

Joint ventures are companies over which MTU exercises joint control together with one or more other entities in accordance with IFRS 11. MTU's joint ventures, namely

- AES Aerospace Embedded Solutions GmbH, Munich, Germany;
- Airfoil Services Sdn. Bhd., Kota Damansara, Malaysia,
- Ceramic Coating Center S.A.S., Paris, France;
- Engine Maintenance Europe Aero sp. z o. o., Jasionka, Poland;
- MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China, and
- Pratt & Whitney Canada Customer Service Centre Europe GmbH, Ludwigsfelde, Germany

are included in the consolidated financial statements using the equity method of accounting based on their materiality for the presentation of the Group's net assets, financial position and results of operations.

Non-material investments

Non-material investments are shares in companies and stakes in engine programs whose overall impact on the Group's net assets, financial position and results of operations is currently and foreseeably insignificant. These investments are measured at fair value and recognized in other comprehensive income in the consolidated financial statements in compliance with the requirements of IFRS 9.

Restrictions

In certain cases, MTU or its subsidiaries may be subject to restrictions on their ability to transfer liquid funds or other assets to other Group companies. Such restrictions may stem from regulatory requirements or from contractual agreements.

Consolidation principles

All business combinations are accounted for using the acquisition method in accordance with IFRS 3. Under the acquisition method, the acquirer accounts for the business combination by measuring and recognizing the identifiable assets acquired and the liabilities and contingent liabilities assumed. The identifiable assets, liabilities, and contingent liabilities are measured at fair value. Any excess of the purchase price over the net fair value of the acquired assets is recognized as goodwill and tested for impairment in accordance with IAS 36 at least annually, or at shorter intervals if there is an indication that the asset might be impaired. If the Group's interest in the net fair value of the acquired identifiable net assets exceeds the cost of the business combination, that excess (negative goodwill) is recognized in the income statement after remeasurement as required by IFRS 3.36.

The effects of intragroup transactions are eliminated. Receivables and liabilities as well as expenses and income between the consolidated companies are offset against each other. Intersegment sales within the Group are transacted at arm's length at standard market terms and invoiced in the same way as transactions with external third parties. Intragroup profits and losses are eliminated.

Currency translation

Transactions in foreign currencies are translated to the functional currency using the exchange rate prevailing on the date of the transaction. At the reporting date, monetary items are translated using the exchange rate prevailing at that date, whereas non-monetary items are translated using the exchange rate prevailing on the actual transaction date. Translation differences are generally recognized in the income statement. The assets and liabilities of Group companies whose functional currency is not the euro are translated from the corresponding local currency to the euro using the closing exchange rate at the reporting date. In the income statements of foreign Group companies whose functional currency is not the euro, income and expense items are translated each month using the exchange rate applicable at the end of the month; the average exchange rate for the year can be derived from these end-of-month exchange rates. The translation differences arising in this way are recognized in other comprehensive income and do not have any impact on the net profit/loss for the year.

Accounting policies

The consolidated financial statements of MTU Aero Engines AG, Munich, and its subsidiaries are prepared using uniform accounting policies based on the International Financial Reporting Standards (IFRSs).

Revenue

IFRS 15 states that revenue from contracts with customers should be recognized as an amount that reflects the consideration to which the entity expects to be entitled in exchange for the promised goods or services as part of its contractual performance obligation. A five-step model framework is used to identify and measure this revenue:

1. Identify the contract(s) with the customer,
2. Identify each party's performance obligations in the contract,
3. Determine the transaction price,
4. Allocate the transaction price to the performance obligations in the contract,
5. Recognize revenue when (or as) the entity satisfies a performance obligation.

Identification of the contract(s) with the customer

Contracts may be entered into in writing, orally or implicitly in the ordinary course of business. In each case, the contracts must be enforceable and have commercial substance. A contract with a customer will be within the scope of IFRS 15 if these conditions are met and as soon as it is "probable" that MTU will collect the consideration to which it is entitled for the performance of the contractually agreed work and services. When the probability that the consideration will be collected is assessed, the customer's ability and intention to deliver the consideration by the due date are taken into account. MTU considers contracts to be within the scope of IFRS 15 if:

/ all parties are in agreement with the terms of the contract,
/ each party's rights in relation to the goods or services to be transferred can be identified,
/ the payment terms for the goods or services to be transferred can be identified,
/ the contract has commercial substance, and
/ it is probable that the consideration to which MTU is entitled in exchange for the goods or services will be collected.

If, at the reporting date, a contract with a customer does not yet meet all of the above criteria, the company will continue to re-assess the contract at regular intervals until such time as the criteria are met. From this point onward, IFRS 15 will be applied to the contract.

In the commercial OEM segment, MTU identifies the respective consortium leaders (OEMs), which exercise control over the consortium, as customers within the meaning of IFRS 15 in the case of the existing risk- and revenue-sharing partnerships in the commercial engine business. In the case of risk- and revenue-sharing partnerships with joint consortium leadership (as is the standard for the military engine business), by contrast, the customer served by the consortium (e.g., an air force) is identified as the customer within the meaning of IFRS 15. In the commercial maintenance business (MRO segment), MTU identifies customers within the meaning of IFRS 15 on the basis of the regular direct customer (e.g., aircraft operator, leasing company).

Contract modification

Long-term service agreements in particular are often modified to take changes in the terms and conditions into account. The renewal of existing contracts is also regarded as a contract modification. A contract modification in accordance with IFRS 15 exists if the changes either create new rights and obligations or modify existing enforceable rights and obligations, thus altering the scope of the contract and/or the agreed price. Such changes must be accounted for either by modifying the existing contract or by establishing a separate, new contract. In the commercial maintenance business (MRO segment) in particular, maintenance for engine fleets can be arranged by way of long-term service agreements. The renewal of such long-term service agreements is usually accounted for as the termination of the old contract and the simultaneous establishment of a new contract.

Identification of performance obligations

Once a contract has been identified as being within the scope of IFRS 15, its terms and conditions and the company's general terms of business are assessed in order to identify the promised goods or services (or bundle of goods and services) to be treated as distinct performance obligations and subsequently recognized. A good or service is distinct if the customer can benefit from the good or services on its own or in conjunction with other readily available resources, and if the promise to transfer the good or services to the customer is separately identifiable from other promises in the contract.

MTU's material performance obligations are as follows:

- manufacturing/delivery of aircraft engine components (sometimes including their assembly into modules)
- development/provision of engine technology
- other technical services, in particular, with regard to the development and repair of engines and the maintenance and overhaul of engines and Industrial gas turbines

Determination of the transaction price

The transaction price is the amount of consideration to which a company expects to be entitled in exchange for the transfer of goods or delivery of services to a customer. Where a contract contains elements of variable consideration, the company will estimate the amount of variable consideration to which it is entitled under the terms of the contract.

Variable consideration included in the transaction price is only recognized as revenue to the extent that MTU considers a subsequent revenue reversal highly improbable.

The agreed transaction price is reduced in the case of qualified payments to customers. MTU defines such payments to customers as payments that are not made in exchange for identifiable goods and services that are independent of MTU's performance obligations toward its customer. Such payments to customers, especially in the commercial engine business (OEM segment), are customary in the sector in connection with compensation for engine development and certification, measures to gain market access and customer acquisition, and joint liability for warranty risks and contractual penalties.

Allocation of transaction price to performance obligations

Where a contract comprises multiple performance obligations, the transaction price is allocated to the performance obligations by reference to their standalone selling prices. Standalone selling prices are based whenever possible on information that is observable in the market. Certain variable consideration components are allocated in full to a performance obligation by reference to their economic substance. Factors taken into account here are that the performance obligation is substantially satisfied by MTU and the allocation is in line with the contractual objectives for the allocation of the transaction price. If no standalone selling price is directly observable, MTU as a general rule estimates the applicable transaction price on the basis of the expected costs plus an appropriate margin by assessing relevant information that can be obtained without undue effort.

In the case of contracts in the commercial and military engine business (OEM segment) in which MTU's role is effectively that of a supplier or service provider to the consortium leader (OEM), without the responsibility to provide development assets or engine technology, the transaction prices are fixed in the consortium agreement, including variable elements. These transaction prices must be allocated in full to the goods delivered or services provided (e.g., engine assembly).

For commercial consortium agreements in which MTU assumes responsibility for providing development/engine technology to the consortium or consortium leader (OEM) in addition to supplying parts or performing assembly, engine maintenance and other maintenance services, MTU initially allocates the contractually agreed, market-driven transaction prices (relative standalone selling prices) to the corresponding delivery and performance obligations. The additional contractually agreed variable consideration (share in the net profits of the engine program) is allocated to the obligation to provide the development/provision of engine technology.

In the commercial maintenance business (MRO segment), transaction prices fixed in the consortium agreement, including variable elements, are allocated with reference to the relative standalone selling prices to the identified components of the respective maintenance contracts.

Recognition of revenue when performance obligations are satisfied

Revenue is recognized, either over a specific period of time or at a point in time, when control of a good or service is transferred.

Revenue from the delivery of engine modules and components is recognized at a point in time and calculated with respect to the effective transfer of control to the customer and the associated beneficial risks and opportunities. Revenue from customer-specific services – such as development projects and especially engine maintenance – is recognized over time if they meet the necessary criteria.

When such revenue is recognized over time, the amount of completed work is determined as the ratio of contract costs incurred up to the reporting date to total contract costs.

In the reporting period and the previous year, all substantial claims to consideration identified or to be identified in the future in connection with the provision of goods and services for which orders had been placed as of the reporting date are classified as contracts with customers pursuant to IFRS 15.

Contracts with subcontractors

MTU sometimes works with subcontractors to fulfill its performance obligations. When MTU subcontracts the repair of engine components to a third party, MTU remains responsible for the quality of these repairs vis-à-vis the customer. MTU is normally responsible for ensuring certification of the airworthiness of the delivered engine components. Subcontractors bill MTU on a commercial basis. This is independent of MTU's invoicing of its customers.

MTU is thus the principal contractor and reports its revenue as a gross amount. Therefore, MTU recognizes amounts billed to its customers in revenue and the bills received from subcontractors in the cost of goods sold.

Activity as agent for the sale of non-MTU parts

As a member of certain engine consortia in the military sector, MTU participates in the sale of parts made by other partners, in addition to its development and production activities. The specific tasks performed by MTU consist, in particular, of organizing and supporting the sales process. The corresponding commission on the sale is recognized as revenue when no uncertainty exists as to the amount of revenue arising from the sale, which is then recognized at a point in time.

Since MTU is the agent in this transaction, it recognizes the net amount of the consideration to which it is entitled for its activity as an agent.

Cost of goods sold

The cost of goods sold comprises the production cost of goods and services sold, including customer-funded development work, and the cost of products purchased for resale. In addition to direct material and production costs, it also comprises allocated production overheads, including amortization of production-related intangible assets and depreciation of production facilities, write-downs on inventories and an appropriate portion of production-related administrative overheads.

Research and development expenses

Research costs are expensed in the period in which they are incurred.

In the case of development costs, a distinction is drawn between customer-funded development work and company-funded development work. Services provided as part of customer-funded development projects (e.g., government-funded technology programs) are reported in cost of goods sold, in light of the fact that the incurred costs are reimbursed by a contracting entity.

Services provided as part of customer-funded development projects (e.g., government-funded technology programs) are reported in cost of goods sold, in light of the fact that the incurred costs are reimbursed by a contracting entity.

Development costs generated in the context of company-funded development projects are capitalized in accordance with IAS 38 or recognized as an expense in the period in which they are incurred. The capitalized development costs comprise all costs directly attributable to the development process and are amortized over the asset's respective useful life from the start of marketing of the engine program by MTU.

Intangible assets

Externally acquired and self-generated intangible assets are recognized in accordance with IAS 38 if it is probable that a future economic benefit is associated with the asset and the cost of the asset can be measured reliably.

Intangible assets with a finite useful life are carried at their purchase or production cost and amortized on a straight-line basis over their useful lives.

Amortization is based on the following regular useful lives:

[T58] Useful lives of assets (in years)

Program assets arising from the purchase price allocation and self-generated development assets	Maximum 30
Customer relationships	4 – 26
Other assets	3 – 10

The useful lives and amortization methods pertaining to intangible assets are regularly assessed for appropriateness, and adjustments are made where necessary to the estimates used when the financial statements are being prepared.

Goodwill is tested for impairment regularly or as necessary in accordance with IAS 36. Each of the two operating segments, OEM (commercial and military engine business) and MRO (commercial maintenance business), is tested separately.

Property, plant and equipment

Property, plant and equipment are subject to wear and tear and are carried at their purchase or production cost less cumulative depreciation charges and impairment losses. The cost of items of self-constructed plant and equipment comprises all directly attributable costs and an appropriate proportion of production-related overheads. These assets are assigned to an appropriate category once they have been completed or are operational. The revaluation model is not applied. Depreciation on property, plant and equipment is calculated using the straight-line method in accordance with the useful life of the asset.

Depreciation is based on the following regular useful lives:

[T59] Useful lives of assets (in years)

Buildings	20 – 50
Lightweight structures	10 – 15
Property facilities	10 – 20
Technical equipment, plant and machinery	5 – 25
Operational and office equipment	1 – 14

The useful lives of machines used in multi-shift operation are reduced accordingly to take account of additional usage.

Public sector grants and assistance

In accordance with IAS 20, public sector grants and assistance are not recognized until there is reasonable assurance that the conditions attached to them will be complied with and that the grants will be received. Grants are recognized as other operating income in the periods in which the related expenses arise. This item also includes the reimbursement of personnel expenses under relevant government assistance programs. MTU passes payments made by the Federal Employment Agency for short-time working on to its employees and therefore treats such payments as transitory items.

In the case of capital expenditure on property, plant and equipment and on intangible assets, the amount of the public sector grant awarded for this purpose is deducted from the purchase or production costs of the asset. The grants are then recognized in the income statement using reduced depreciation/amortization amounts over the lifetime of the asset. If public sector grants and assistance are not directly linked to assets that are subject to depletion, they are generally recognized as other operating income in the periods in which expenses arising from fulfillment of obligations related to the grants are incurred. This does not apply to grants funding technology which are reported as revenue in the year they are received.

Borrowing costs

Borrowing costs directly related to the acquisition, construction or production of qualifying assets are added to the purchase or production costs of those assets in accordance with IAS 23 until such time as the assets have been made ready for sale or for their intended use. Qualifying assets are those that require a substantial period of time to be made ready for sale or for their intended use.

Borrowing costs are capitalized only insofar as they relate to the purchase and preparation of qualifying assets for their intended use or sale, and only include activities that commenced on or after January 1, 2009.

Leases

A contract is accounted for as a lease if it grants the following rights:

- right to control the use of an identified asset in return for compensation
- right to obtain substantially all the economic benefits from that use

At the start of the lease, a lease liability and a right-of-use asset are recognized. Right-of-use assets are recognized at cost less all cumulative depreciation charges and all cumulative impairment losses. The Group recognizes lease liabilities at the present value of the lease payments to be made over the term of the lease. Lease payments are both fixed and variable.

The Group generally calculates the present value of lease payments by applying its incremental borrowing rate at the delivery date, because the interest rate underlying each lease regularly cannot be determined reliably on an individual basis. After the delivery date, interest is added to the lease liabilities, and they are reduced by lease payments made. In addition, the carrying amount of the lease liabilities is remeasured when there is any modification of the lease, lease term, or lease payments (e.g., changes in future lease payments due to a change in the index or interest rate used to determine those payments), or a change in the assessment of an option to buy the underlying.

Lease payments are reported in the cash flow statement, with the amount of the lease liabilities paid recognized in cash flow from financing activities and the interest component paid recognized in cash flow from operating activities.

For accounting purposes, certain future developments are only taken into account if their occurrence is deemed to be sufficiently certain. Assets and liabilities are not recognized in the case of short-term leases or leases for low-value assets. Payments for short-term leases or low-value asset leases as well as variable lease payments are recognized as an expense in function costs in the income statement in the period in which they occur.

If the Group acts as lessor, all leases at the start of their term are classified as either finance leases or operating leases.

In this context, classifying a lease requires the Group to make an overall assessment as to whether the lease transfers all significant risks and opportunities associated with ownership of the underlying asset. If this is the case, the lease is classified as a finance lease; if not, it is classified as an operating lease. In making this assessment, the Group takes into account certain indicators, such as whether the lease covers most of the useful life of the asset.

On the delivery date of the leased assets, assets held in a finance lease are recognized as a receivable in the amount of the net investment in the lease. The market interest rate used to calculate the lease is used to measure the net investment in the lease.

Acquired program assets and acquired development work

MTU refers to program assets and acquired development as deferred compensation payments to the consortium leader (OEM or customer) in favor of inclusion in or compensation for development services for the respective engine program. Since there is not specific consideration, MTU classifies these as revenue-reducing payments to customers in accordance with IFRS 15. The above payments always refer to the lifetime of the program and are therefore systematically incurred at the start of the respective engine program. Consequently, these payments are accrued and recognized as non-current assets. These assets are amortized against revenue over the lifetime of the program in question, which generally means a period of up to 30 years.

If the above payments contain significant deferred conditional components, these are accounted for analogously to IFRIC 1. Changes resulting from reassessment of the deferred condition components are initially recognized outside of profit or loss by adjusting the related assets. This is amortized through profit or loss over the remaining lifetime of the program.

Impairment of intangible assets, property, plant and equipment, acquired program assets and acquired development work

At each reporting date, an analysis is carried out to reveal any indication that the value of intangible assets, or property, plant and equipment, or acquired program assets or development work might be impaired. If impairment is indicated, the value of the asset in question is assessed on the basis of its recoverable amount.

While assets with an indefinite useful life, intangible assets that are not yet ready for use, and goodwill acquired in connection with a business combination are not subject to amortization, they are reviewed for impairment at least once each year, regardless of the circumstances. Annual impairment testing takes place at the level of the cash generating units, corresponding to the two operating segments commercial and military engine business (OEM) and commercial maintenance business (MRO).

The impairment loss on intangible assets, property, plant and equipment and acquired program assets or acquired development work is determined by comparing the carrying amount with the recoverable amount. The recoverable amount is either the fair value of the asset (or of the cash-generating unit) less costs to sell, or the value in use, whichever is higher. The recoverable amount is usually determined using a discounted cash flow (DCF) method.

When applying the discounted cash flow (DCF) method, the weighted average cost of capital (WACC) before tax is derived iteratively on the basis of a corresponding after-tax discount rate. This is derived from the cost of equity after tax, which is based on a risk-free base interest rate and a risk premium (market risk premium multiplied by the beta coefficient calculated on the basis of a peer group analysis). The cost of debt of the peer group companies is also factored into the calculation. Cost of equity and cost of debt are weighted according to the average capital structure of the peer group companies when determining WACC after tax.

If it is not possible to attribute separate future cash flows to discrete assets that have been generated independently of other assets, then an impairment test must be carried out on the basis of the cash-generating unit to which the asset (group) ultimately belongs. For this purpose, the cash flows that can be generated by the asset or cash-generating unit are forecast. The discount rate takes account of the risks associated with the asset or cash-generating unit.

If there is sufficient certainty that the reasons for impairment losses recognized in a prior period for assets or their cash-generating units are considered obsolete, the impairment loss on these assets is reversed, except in the case of goodwill.

Non-current financial assets

Investments in joint ventures and associates that have a material impact on the Group's net assets, financial position and results of operations are accounted for using the equity method. The Group's share in the profit or loss of these entities is therefore allocated on a pro rata basis to profit/loss and to the corresponding carrying amount of the investment. This profit/loss is reported as a separate line item in "profit/loss of companies accounted for using the equity method."

Investments in subsidiaries that are not consolidated, and other equity investments and loans, are recognized at fair value. Here, MTU makes use of the option of recognizing such assets in other comprehensive income. Dividend payments received from these equity investments are included in the profit/loss of equity investments.

Inventories

Raw materials and supplies are measured at average purchase cost or net realizable value, whichever is lower. Transaction price reductions such as rebates, bonuses or cash discounts are taken into account when determining acquisition cost. Purchase cost comprises all direct costs of purchase and other costs incurred in bringing the inventories to their present location and condition.

Finished products and work in progress are recognized at purchase/production cost or net realizable value, whichever is lower. The purchase/production cost comprises all purchase costs and production-related expenses based on normal capacity utilization. In addition to direct costs, these include an appropriate and necessary portion of the cost of material and production overheads, including production-related depreciation. Administrative expenses are also included to the extent that they can be attributed to production operations.

Net realizable value is the estimated selling price generated in the ordinary course of business for the finished goods in question, less estimated costs necessary to make the sale (costs to complete and selling expenses). In the commercial engine business (OEM), the net realizable value from the marketing of inventories in the new parts or series business at the consortium level is regularly below the corresponding purchase/production cost. In the commercial maintenance business, the marketing of engine parts is affected, in particular, by the availability of used parts and by demand resulting from current usage of the engine fleet. Valuation allowances are recognized through profit or loss to account for the impairment risk of inventories.

Idle capacity costs due to underutilization of normal capacities, e.g., as a result of a pandemic, are not reflected in the production cost rather recognized directly in profit or loss.

Contract assets

A contract asset represents the Group's right to consideration for goods or services it has transferred to a customer on a contractual basis. A contract asset is recognized when the Group has satisfied its performance obligations and when its right to consideration is conditional on something other than the passage of time. If the right to consideration is unconditional except for the passage of time, it is recognized as a trade receivable and accounted for in accordance with the accounting principles for financial instruments. The contract assets are presented on the basis of contracts with customers, taking into account any upfront payments.

Financial instruments

A financial instrument is a contract that simultaneously gives rise to a financial asset in one company and to a financial liability or equity instrument in another company.

Financial assets

Financial assets include, in particular, cash and cash equivalents, trade receivables, loans to third parties, other receivables, and derivative financial assets.

At initial recognition, financial assets are measured at their fair value. The measurement of a financial asset subsequent to initial recognition depends on its classification. Financial assets are measured at amortized cost if the purpose is to hold the financial assets in order to collect contractual cash flows and the contractual terms of the financial asset give rise on specified dates to cash flows.

Financial assets are measured at fair value through other comprehensive income if the purpose is to hold the financial assets in order to collect contractual cash flows and the contractual terms of the financial asset give rise on specified dates to cash flows and, additionally, these assets are to be sold at maturity. A distinction is made between debt instruments for which the accumulated gains and losses are reclassified on derecognition and equity instruments for which this is not the case. MTU has elected to use the option offered by IFRS 9 of recognizing equity instruments at fair value through other comprehensive income.

All other financial assets are measured at fair value through profit or loss.

Arm's length acquisitions and disposals of financial assets are recognized as of the fulfillment date.

Impairment loss on financial assets

The impairment model in IFRS 9 is based on the premise of providing for expected losses.

In the case of trade receivables and contract assets, expected losses are recognized for the entire remaining duration of the contract (full lifetime loss allowance). For all other financial instruments, expected credit losses are measured at an amount equal to the 12-month expected credit losses, unless there has been a significant increase in the credit risk. Otherwise, expected losses are also recognized for these financial assets over their remaining term to maturity.

To determine whether there has been a significant increase in the credit risk of a financial asset, the probability of default is assessed at least once a quarter using both external rating information and internal information on the credit quality of the financial asset. In the case of debt instruments, a significant increase in the credit risk is determined principally on the basis of past-due information or probability of default.

When calculating the expected credit losses, an amount is factored in for the possible impairment of groups of financial assets with a comparable credit rating. The loss allowance is based on credit spreads covering good, average and poor credit ratings. The classifications used by international rating agencies are applied when making these measurements.

The credit rating of financial assets is considered to be impaired and a corresponding impairment loss is recognized in profit or loss in the following cases: significant financial difficulties of the debtor or a high probability that the debtor will enter bankruptcy or financial reorganization; the closure of an active market; significant changes in technological, economic, legal or market conditions affecting the issuer; or a significant or persistent decline in the fair value of the financial asset below its amortized cost. An impairment loss only recognized as such after it has been established that the value of the asset is unrecoverable.

Financial liabilities

Financial liabilities often oblige the holder to return the instrument to the issuer in return for cash or another financial asset. Financial liabilities include, in particular, bonds and other liabilities evidenced by certificates, trade payables, finance lease liabilities, promissory notes, derivative financial liabilities and other financial liabilities to third parties, especially banks.

Financial liabilities are measured at their fair value at the time of acquisition, which is normally equivalent to the fair value of the settlement amount. Transaction costs directly attributable to the acquisition are deducted from the amount of all financial liabilities. If a financial liability is interest-free or bears interest at below the market rate, it is recognized or initially measured at an amount that generally deviates from the settlement price or nominal value. The financial liability initially recognized at fair value is amortized subsequent to initial recognition using the effective interest rate method.

Cash and cash equivalents

The salient features of cash and cash equivalents, which include demand deposits, money market funds and short-term bank deposits, are that they have an effective maturity of three months or less from the date of acquisition; assuming the appropriate creditworthiness of the debtor, they are measured at their nominal value.

Derivative financial instruments

MTU uses derivative financial instruments as a hedge against currency and price risks arising from its operating activities and financing transactions.

At initial recognition and when measured subsequently, derivative financial instruments are measured at their fair value. This value is generally determined using quoted market prices in an active market and is represented by the amount that MTU would receive or would have to pay at the reporting date if the financial instrument were terminated. If no quoted market prices in an active market are available, the fair value is calculated using recognized financial mathematical models (DCF method) on the basis of the relevant exchange rates, interest rates and credit standing of the contractual partners at the reporting date.

Hedge accounting (hedging relationships)

MTU satisfies the requirements of IFRS 9 concerning instruments used to hedge future cash flows. When a hedge is undertaken, the relationship between the financial instrument designated as the hedging instrument and the underlying transaction is documented, as are the risk management objective and strategy for undertaking the hedge. This includes assessing the effectiveness of the hedging instrument used. Existing cash flow hedges are checked for effectiveness on a regular basis.

MTU uses cash flow hedges to hedge the exposure of future payment cash flows transacted in U.S. dollars (underlying transactions) to fluctuations in foreign currency exchange rates. At remeasurement subsequent to initial recognition, the effective portion of the hedging instrument is recognized in equity under other comprehensive income, together with attributable deferred taxes, until such time as the underlying hedged transaction is realized.

The amounts recognized in other comprehensive income at remeasurement are recycled to the income statement as soon as the underlying hedged transaction is recognized. The cost of effective hedging instruments used to hedge cash flows from revenue-generating transactions (cash flow hedges) are recognized in other operating income.

Current and deferred taxes

Current and deferred taxes are recognized in the consolidated financial statements in the manner prescribed in the relevant tax jurisdictions. Current and deferred taxes are recognized in equity if they relate to business transactions that directly lead to a decrease or increase in equity.

The MTU Group assesses whether it is probable that a tax authority will accept a specific tax treatment. Based on this assessment, it determines the taxable profit, tax bases, unused tax losses, unused tax credits or tax rates consistently with the tax treatment that it uses or plans to use in its income tax filings.

If MTU concludes that it is probable that the tax authority will not accept a tax treatment, it reflects the effect of this uncertainty when determining the related taxable profit, tax bases, unused tax losses, unused tax credits or tax rates through a best estimate (e.g., the amount/expected amount) or the most likely outcome.

If this tax treatment affects both current tax and deferred taxes, the MTU Group makes consistent judgments and estimates for both current and deferred taxes, or makes estimates that are coherent for both taxes.

Interest on back taxes and tax refunds arising from tax audits is recognized in interest expense in the income statement.

Deferred tax assets and liabilities are established for temporary differences between the tax bases of assets and liabilities and their carrying amount in the consolidated balance sheet. Tax assets are established on tax credits available for carry-forward at such time as the conditions attached to the award of the tax credit have been fulfilled. Similarly, deferred tax assets are established on tax losses available for carry-forward. Deferred tax assets are recognized to the extent of the probability that taxable income will be available against which the deductible temporary difference can be applied together with losses as well as tax credits that are permitted to be carried forward. Deferred tax assets and liabilities are measured using the tax rates applicable on the date when the temporary differences are reversed. Deferred tax assets and liabilities are offset insofar as this meets the relevant requirements of IAS 12.

Pension obligations

Provisions for pension obligations are accounted for using the projected unit credit method in accordance with IAS 19. This method takes into account not only pension and other vested benefits known at the reporting date, but also expected increases in pensions and wages and salaries, applying a conservative assessment of the relevant parameters.

In the case of defined contribution plans, the company has no obligations beyond the payment of contributions to the plan. In the case of defined benefit plans, the company has an obligation to fulfill commitments to current and former employees.

In some cases, it is difficult to differentiate between defined contribution and defined benefit plans. In Germany, for example, a minimum level of benefits is guaranteed for defined contribution plans, such that, even when the plan is provided through an external fund or insurance company, MTU, as the employer, remains liable. This "ultimate employer liability" is governed in Germany by the German Occupational Pensions Act (BetrAVG). For financial reporting purposes, the term "defined benefit plan" is interpreted on the basis of the underlying economic substance of the arrangement. Insofar as the MTU Group has no material obligations beyond its "ultimate liability" once the contributions have been paid to state and private pension funds, these plans are classified as defined contribution plans. Current contributions are recognized as personnel expenses through profit and loss in the period in which they are paid.

Actuarial gains and losses – from the measurement of the defined benefit obligation (DBO) or the associated plan assets – may arise either from changes in the actuarial assumptions used or when the actual development diverges from those assumptions. They are recognized in other comprehensive income in the period in which they arise and are recognized separately in the statement of comprehensive income. By contrast, past service cost is recognized directly in profit and loss. If the criteria given in IAS 19 are met, reinsurance claims are treated as plan assets and netted against the corresponding pension obligations. The interest expense resulting from the reversal of the discount on the net liability, comprising pension obligations less the corresponding plan assets, is recognized through profit and loss under other financial income/expense. Service cost is recognized in the income statement as personnel expenses allocated to the relevant function costs.

Other provisions

In accordance with IAS 37, other provisions are recognized to cover legal or constructive obligations resulting from past events if settlement is expected to result in an outflow of resources. Relevant obligations regularly arise in connection with claims on warranties and the risk from pending contracts, missing invoices or outstanding costs, personnel costs, various taxes (especially excise duties), and other costs such as the risk of legal action and lawsuits, for instance in connection with government investigations.

If a planned and controlled restructuring program has been presented by the management, provisions are recognized for the expenditures arising directly from the restructuring. Restructuring provisions are recognized only if there is a constructive restructuring obligation and if the related expenditures are both necessarily incurred as a result of the restructuring and not associated with the company's ongoing operating activities.

Non-current provisions for liabilities with an identifiable maturity of more than one year beyond the reporting date are measured at the present value of expected future cash flows. The company measures provisions for pending losses on onerous contracts at the lower of the expected costs on settlement of the contract and the expected costs on premature termination of the contract.

Provisions for personnel obligations are recognized in accordance with IAS 19 or IAS 37. Obligations relating to pre-retirement part-time working arrangements and long-service awards are measured on the basis of actuarial reports.

Contingent liabilities

Contingent liabilities are potential obligations arising from past events whose existence depends on the occurrence or non-occurrence of one or more uncertain future events that are not wholly within the control of MTU. Contingent liabilities are not recognized as liabilities in the balance sheet because at the reporting date it is considered that there is unlikely to be an outflow of economic resources, or, as an exception, the amount of the obligation cannot be reliably estimated.

Contract liabilities

When a customer pays the consideration for a performance obligation, or if the company has an enforceable right to receive a specified consideration prior to the transfer of a good or service to the customer, the company presents such contracts with customers as contract liabilities, recognizable on the due date or on the date of settlement in accordance with IFRS 15. Recognition of a contract liability signifies that MTU has entered into an agreement with a customer in which it promises to transfer goods or services to that customer in exchange for consideration. In the commercial OEM business, MTU is, in individual cases, a partner in consortia for engine programs, and participates in the contract liabilities of the respective engine program controlled by the OEM resulting from the portfolio of program customer contracts. MTU releases amounts from the balance of such liabilities to revenue taking into account refund liabilities. MTU recognizes these refund liabilities through profit or loss as part of realizing their participation in program profits in connection with the maintenance and repair services business (aftermarket) of the respective engine program. The latter is directly relevant to participating in the aforementioned contract liabilities of the respective engine program. The contract liabilities are presented on the basis of contracts with customers, taking into account any corresponding contract assets accrued as of the reporting date.

Refund liabilities

In accordance with IFRS 15, a refund liability is recognized if the company receives consideration from a customer and expects to refund some or all of that consideration to the customer. Refund liabilities represent the amount of consideration to which the company does not expect to be entitled at the reporting date. In the commercial OEM business, MTU may participate in program profits through the provision of development work/technology. Such participation regularly involves retrospective price corrections. These are attributable to rebates on invoiced list prices in the respective programs' series or new parts business and its spare parts or aftermarket business, which are common practice in the sector. MTU takes this invoicing practice of the commercial engine industry into account in revenue recognition, especially in connection with the realization of its participation in the program profits, through provisions for refund liabilities, which affect revenue.

Dividend payment and profit distribution

The claims of shareholders to dividend payments and profit distribution relating to a specific reporting period (fiscal year) are recognized as a liability in the period in which the corresponding resolution is passed. Disclosures relating to the Executive Board's or Supervisory Board's proposal to the Annual General Meeting concerning the dividend payment are provided in Section VII. "Determination of the net profit available for distribution on the basis of the annual financial statements".

Discretionary scope, measurement uncertainties and sensitivity

Preparation of the consolidated financial statements in accordance with IFRSs requires that assumptions and estimations be made that have an impact not only on the amounts of the assets and liabilities as well as contingent liabilities, but also on how these items are recognized. These assumptions and estimations conform with the circumstances prevailing at the reporting date and, to that extent, also influence the amount of income and expenses recognized in the reporting periods presented. The assumptions and estimations relate primarily to the Group's own determination of the useful lives of intangible assets and property, plant and equipment or the basis for measuring acquired program assets and development work, measuring inventories and contract assets, calculating the fair value of financial instruments and other assets, determining the effective date of planned transactions that form part of a hedging relationship, measuring and recognizing provisions and other liabilities, especially refund liabilities and contract liabilities, and tax assets, especially in connection with temporary differences, tax losses available for carry-forward and tax credits. Furthermore, assumptions and estimations are the elementary basis for planning calculations at company, segment, program, and customer contract level. Such planning calculations form the material basis for impairment testing in accordance with IAS 36, including in connection with program assets, including assets relating to historical purchase price allocations, and in connection with revenue realization in some areas, particularly in regard to the realization of variable remuneration components as defined by IFRS 15.

In individual cases, the actual values may differ from the assumptions and estimations made, so it may be necessary to adjust the measurement of assets and liabilities recognized in the financial statements. Changes are made to estimations when more reliable information becomes available in accordance with IAS 8 and these may have an impact on the figures in the period in which the changes are made and, where applicable, on subsequent periods.

- In principle, the measurement of intangible assets, other assets, property, plant and equipment, and financial assets involves the use of estimations. Judgments by management form the basis for determining the fair value of assets and liabilities and the useful life of assets. If the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the presentation of the Group's net assets, financial position and results of operations.
- In the process of determining impairment losses, estimations are made concerning such parameters as the source, timing and amount of the impairment loss. Many different factors can give rise to an impairment loss, e.g., changes in the competitive situation, expectations concerning the growth of air travel and the aircraft industry, changes in the cost of capital, changes in the future availability of financing funds, aging and obsolescence of technologies, replacement costs, or purchase prices paid in comparable transactions. If the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the presentation of the Group's net assets, financial position and results of operations. Reference is made to Note 14 "Intangible assets" for the sensitivity analysis of the goodwill of the two operating segments and to Note 17 "Acquired program assets, development work and other assets" for the goodwill of program assets.
- Given the long-term nature of engine programs, changes in the cost of capital as a result of changes in interest rates, risk premiums or beta factors and in forecast cash flows from revenue-generating transactions, especially in connection with forecast volume, price and cost structures, the time period for the provision of the work and services and the corresponding consideration within the program can have a significant impact on the assessment of the value of the program-related assets, which are also material for revenue and the cost of goods sold. The principal components of program-related assets, alongside the acquired program assets, are the capitalized compensation payments for developments and own development work, inventories and contract assets. Furthermore, the recognition and especially the amortization of intangible and other program-related assets is also affected by the estimated materialization and dynamic of the volume, price and cost structures for the respective engine program. If the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the presentation of the Group's net assets, financial position and results of operations.

- The interpretation of a sensitivity analysis of the extent of possible consequences of changes to measurement parameters, in particular those relating to claims on warranties, price and quantity structure, the risk from pending transactions, the risk of losses arising from the settlement of accounts, and the measurement of risks arising from legal action and lawsuits, does not allow the consequences of individual events to be assessed, due to the multitude of sensitivity scenarios presenting high degrees of uncertainty.
- In view of the sector's customary spread of expected margins in the series or new parts business, on the one hand, and in the spare parts or aftermarket business, on the other, the assumed "marketing mix" in the commercial OEM programs has a considerable influence on the determination of the fair values of relevant program assets such as inventories and contract assets, and liabilities such as refund and contract liabilities. If the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the presentation of the Group's net assets, financial position and results of operations.
- The management recognizes valuation allowances for expected credit losses from receivables and contract assets. Valuation of the expected credit loss and the hedging instruments used to offset this requires the use of estimations based on assumptions. If the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the presentation of the Group's net assets, financial position and results of operations.
- In certain cases, financial liabilities may be linked to deferred, conditional purchase price components. Determination of the fair value of such liabilities requires predictions about the future development of the parameters affecting their development. These comprise, on the one hand, publicly available market data (interest rate, U.S. dollar exchange rate) and, on the other, input parameters that are not publicly available – specifically, in this case, the number of flight hours on which payments are based for part of the V2500 engine fleet in the period up to 2027. To predict the future number of flight hours, MTU makes use of an in-house forecasting model that is based on internally as well as externally available information concerning the in-service V2500 fleet. The sensitivity analysis takes into account both the absolute number of flight hours on which payments are based and the time period within which these hours arise. If the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the presentation of the Group's net assets, financial position and results of operations. Further information on the financial liability relating to the increase in the stake in the IAE/V2500 can be found in *Note 28 "Financial assets."*
- When revenue is recognized at a point in time, estimates are necessary because, as a partner in engine consortia, MTU receives a fixed and a variable revenue component. The variable revenue component, which is mainly made up of a net profit share and revenue-reducing effects such as losses arising from the settlement of accounts and rebates, is determined on the basis of empirical data and parameters specified in customer contracts, which necessarily implies management forecasting judgments. Estimations are required, in particular, with regard to refund liabilities and, in individual cases, the subsequent measurement of contract assets and liabilities. If the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the presentation of the Group's net assets, financial position and results of operations.
- Revenue recognized over time is accounted for according to progress, if it is sufficiently probable that future economic benefits associated with the business will flow to MTU. Because in some cases it may not be possible to reliably estimate the outcome, revenue calculated according to progress is recognized on the basis of the contract costs incurred up to the reporting date, to the extent that it is probable that these costs can be recovered. The measurement uncertainty is consistent with the complexity and long-term nature of the respective customer contract. Management regularly reviews its estimations made in connection with these customer contracts, making adjustments to the accounting where necessary. If the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the presentation of the Group's net assets, financial position and results of operations.
- Income taxes must be determined for each tax jurisdiction in which the Group operates. Estimates are required when measuring actual and deferred taxes. The utilization of deferred tax assets depends on the possibility of generating sufficient taxable income in a particular tax category and tax jurisdiction. A variety of factors are used to assess the probability that it will be possible to utilize deferred tax assets, e.g., past operating results, operating business plans and the periods over which losses can be carried forward. If

the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the presentation of the Group's net assets, financial position and results of operations.

- The total value of provisions for pensions and similar obligations, and therefore the expenses in connection with employees' retirement benefits, are determined using actuarial methods based on assumptions concerning interest rates, choice of optional payment modalities, wage, salary and pension trends, and life expectancy. If it should become necessary to modify these assumptions, this could have a significant effect on the future amount of pension provisions or the future expenses for pensions and thus on the Group's net assets, financial position and results of operations. Further information on pension provisions can be found in *Note 25 "Pension provisions."*
- The measurement and recognition of other provisions, accrued liabilities (as defined in IAS 37), refund liabilities and contingent liabilities involve substantial estimations by MTU. These concern contractual penalties, the implications of forward-looking information from program partners and customers, the cost of developing suitable engineering solutions, changes in the requirements imposed by flight safety organizations and other aviation authorities, and the cost of meeting warranty obligations and comparable contractual assurances. If the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the presentation of the Group's net assets, financial position and results of operations.
- When accounting for committed aircraft financing agreements, estimations are required concerning the probability that the loans will be realized, the consistency of the terms with market conditions, and the change in the value of the pledged security. If the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the presentation of the Group's net assets, financial position and results of operations.
- In connection with the recognition of leases in accordance with IFRS 16, the assessment whether extension and termination options will be exercised is based on probability. The specific circumstances of each lease are used for this. These circumstances relate, in particular, to the operational need to continue to use the leased asset, the options and limitations of other means of financing and the terms for continued use of leased assets. If the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the presentation of the Group's net assets, financial position and results of operations.

All assumptions and estimates are based on the prevailing conditions and judgments made at the reporting date. Any subsequent changes occurring before the financial statements are prepared are taken into account in the amounts recognized. Estimations of future business developments also take into account the economic environment of the industry and the regions in which MTU is active, such as are deemed realistic at that time.

In order to obtain new information, MTU also relies on the services of external consultants such as analysts, actuaries, appraisers, and tax and legal advisors.

Macroeconomic factors

In fiscal year 2022, macroeconomic factors negatively impacted business performance and were therefore to be taken into particular consideration in preparing the consolidated financial statements in respect to the assumptions and estimates. In light of the delayed effects of the COVID-19 pandemic in combination with critical geopolitical developments, the dynamics of the macroeconomic framework conditions are negatively impacting the ability to forecast MTU's business performance in the medium to long term. Corporate planning requires the forecasting of assumptions regarding the dynamics and scope of the trends in the availability and inflation of fuel, supply chain and personnel capacities relevant to MTU in addition to exchange rate trends and other capital market terms. Negatively impacted by multiple crises, the environment is intensifying uncertainty surrounding estimates in regard to forecasting information for the financial statements, particularly in deriving fair values of assets and liabilities, and in regard to the outlook for MTU's results of operations and liquidity situation. Against this backdrop, MTU strives to apply those parameters affected by macroeconomic factors with due diligence during the corporate planning process. In addition, the Group continues to utilize options for mitigating macroeconomic effects by means of compensating measures such as strategic provisioning, implementing alternative energy sources and concluding forward contracts, especially to compensate for commodity price risks and currency. In its corporate planning, MTU assumes that there will be no short-term stabilization of the international energy, commodity and capital markets and supply chains relative to the status quo. The assumptions and estimations made in preparing the consolidated financial statements as of December 31, 2022, are necessarily based on the best information and knowledge available to the MTU management at that time.

The scenario used for multi-year corporate planning is based on the following principal key assumptions:

The IMF forecasts that global GDP growth will slow in 2023. Following growth of 2.9% in 2022, the IMF expects global economic growth to drop to 2.1% in 2023. One third of the world will probably experience a recession in 2023. The OECD is predicting a similar economic trend in 2023, with a growth rate of 2.2% (source. OECD Economic Outlook, September 2022). The main reasons for the anticipated drop in global GDP growth can be traced to events in recent years: the Covid-19 pandemic, Russia's invasion of Ukraine and natural catastrophes as a result of climate change. According to the OECD, further interest rate rises will be needed in most major economies to ensure a sustained reduction in inflationary pressure. A more restrictive monetary policy and stabilization of supply chains should ease the inflationary pressure in 2023. The IMF anticipates that annual GDP growth will slow further in North America and Europe in 2023: In the USA, growth will drop from 1.6% in 2022 to 1.0% in 2023 and in the euro zone from 3.1% to 0.5%. Shortly before the abrupt end of the zero-Covid policy at year-end 2022, the IMF forecast that Chinese GDP would increase from 3.2% to 4.4% in 2023. The abandonment of the zero-Covid policy on December 7 was initially followed by a sharp rise in Covid infections. The IMF projected that China could make a positive contribution to the global economy from mid-year,

Growing uncertainty about the development of demand is overshadowing the aviation sector in 2023. The slowdown in global economic growth, rising energy costs and general geopolitical uncertainty are likely to adversely affect both the passenger and the cargo market. However, tailwind is coming from the re-opening of China following the end of the zero-Covid policy.

In its forecast of December 2022, IATA predicts a slight upturn in air passenger traffic from 71% of the pre-pandemic level to 85% in 2023. Cargo traffic is expected to decline by 4.1%. This assessment takes account of the re-opening of China, the Ukraine conflict and the emerging global economic slowdown.

According to the IATA forecast, global revenue in the airline sector should recover from U.S.$727 billion in 2022 to U.S.$779 billion in 2023, which would be a good 93% of the pre-crisis level. It forecasts that the sector will be back in the black with a profit of U.S.$ 4.7 billion. IATA's latest forecast is based on an oil price of U.S.$92 per barrel in 2023, which would reduce pressure on the airlines compared with the price of U.S.$103 per barrel in 2022.

Aircraft manufacturers Airbus and Boeing are starting the year 2023 with a high order backlog with orders for 11,817 planes. Both are basing their planning on a further recovery in demand and long-term growth in air traffic Production rates for the A320 and Boeing 737 model ranges are to be increased further, from 50 A320 aircraft a month at present to 75 a month by 2025 and from 30 to 50 Boeing 737 MAX aircraft a month in 2025 or 2026 (sources: FlightGlobal and Cirium). The planned ramp-up of production at Airbus and Boeing represents a challenge for suppliers due to personnel and material shortages and low financial reserves following the pandemic. In view of the sharp drop in international long-haul traffic, production forecasts for the twin-aisle market are more cautious. For example, planned monthly production of the 787 is six to seven aircraft, with a planned increase to ten per month in 2025 or 2026. Boeing assumes that it will deliver the first Boeing 777X aircraft in 2025.

For the commercial OEM and MRO business, it was assumed that global passenger traffic will be back at the 2019 level in 2024 (basis: IATA and Tourism Economics, September 2022). Meanwhile, the conflict raging in Ukraine since the end of February has only moderately curbed the ongoing market recovery. The market for regional and mid-haul aircraft is driven by domestic traffic, which IATA expects to recover in 2023. The negative effects of the pandemic continue to have a bigger impact on the market for long-haul aircraft than for regional and mid-haul aircraft; therefore, long-haul aircraft are not expected to return to the 2019 level until 2025. In the long term, MTU assumes annual growth in passenger traffic of 3.5% (annual growth rate from 2019 to 2041). In view of the reduction in cargo capacity in passenger aircraft, and despite a decline in overall air cargo forecast by IATA, capacity utilization of cargo aircraft is expected to remain very high. Programs with a high proportion of cargo aircraft such as the CF6-80C and PW2000 will benefit from this. In the MRO segment, MTU anticipates strong demand for engines for mid-haul aircraft (e.g. GTF, CFM56, V2500) and the beginning of the recovery for long-haul aircraft (e.g. GE90). Further information on revenue from the commercial engine business can be found in Note 1 "Revenue."

Due to the aftershocks of the coronavirus crisis and the current crisis in Ukraine, the effect on the military business is similar to that of the commercial engine business. In the military business, however, cost increases for energy and raw material and personnel costs can largely be passed on to the respective customer (e.g., cost-plus contracts). From today's perspective, MTU did not profit in the reporting period from the €100 billion in supplementary funding for upgrading the German armed forces as, for instance, MTU is not participating in the joint strike fighters (JSF) ordered from the US by the federal government. In the long term, MTU's military business could benefit from more intensive use of the military fleet demand for spare parts as a result of longer useful lives of the fleets of military aircraft relevant to MTU (e.g. Eurofighter). New programs such as Future Combat Air System (FCAS) and, in this context the Next European Fighter Engine (NEFE) support MTU's future military engine business. Further information on revenue from the military engine business can be found in Note 1 "Revenue."

Therefore, MTU assumes that the impact of current macroeconomic factors on global air traffic and thus on the business development of MTU and its consolidated financial statements will be temporary. Nonetheless, these factors affect estimations used to derive the fair value of intangible assets, program assets, inventories, contract assets and receivables.

Climate change

The impacts of climate change were taken into consideration by the management, to their best discretion, for the preparation of the consolidated financial statements, both in terms of assessing the company's continuation as a going concern as well as for the purpose of deriving targets, e.g., in the context of evaluating impairment risks. In the final analysis, MTU assumes that the measures to prevent or offset climate change are not expected to have a material effect on the development of those engine programs in which the Group is currently invested or involved – neither in the OEM nor in the MRO segment. Here, MTU considers the EU Green Deal, which is derived from the 1.5°C target of the Paris Agreement and aims for climate neutrality by 2050.

In particular, the effects of climate change were analyzed in the context of substituting MTU engine technologies with functionally comparable, significantly lower emission drive technologies (aircraft engines).

New aircraft and propulsion systems are currently being investigated in order to make a contribution to meeting the ambitious climate targets. In 2021, Airbus presented three aircraft concepts in this context that could facilitate emission-free commercial flights, with an increased focus on hydrogen. Modified engines should allow direct combustion of this volatile gas. According to Airbus, this technology could come into use from 2035. While combustion of hydrogen in modified engines would hardly alter MTU's present business model, electric propulsion systems are in principle a substitution risk for conventional engine technologies. However, they do not yet come anywhere near the performance required to power a large passenger or freight aircraft. Together with its research partners, MTU is conducting studies to examine all the conceivable concepts in order to factually assess the opportunities arising from alternative engine concepts and make use of them as appropriate. Among the key results from these studies are:

/ Propulsion systems based on electric batteries are suitable today for applications requiring low performance and short duration of use, such as general aviation and urban mobility. With improvement in the storage capacity of batteries (5% per year), they could be used in several years on commuter aircraft and in about 30 years on regional aircraft. At the moment, there are no known battery concepts with sufficient capacity for short- and medium-haul aircraft, let alone for long-haul aircraft, which together represent an important market for MTU.

- Hybrid propulsion systems combine various power generation and fuel systems, for example, a kerosene-fired gas turbine and a battery-powered electric engine. Potential benefits are additional freedom in the design of aircraft and propulsion systems and integration of the engine. The focus is generally on reducing energy consumption rather than on the climate impact. However, the targets of the Paris Agreement already cover all climate-related emissions. To identify the potential of further hybrid architectures as early as possible, MTU is involved in studies to evaluate such concepts. However, as yet they have not shown any major benefits compared with conventional propulsion systems in terms of energy consumption or climate impact.
- Considerable progress has been made in the development of fuel cells in recent years. However, their present performance potential is not sufficient for commercial aviation. In the long term, however, in conjunction with liquid hydrogen fuel, they have far greater potential for use in aviation than batteries. Together with the German Aerospace Center (DLR), MTU has therefore started working on the development of an optimized fuel cell for use in aviation as part of a national funding project. The aim is to test a prototype on a Dornier Do228 in flight by the middle of this decade.
- CO_2 is used as the starting product for the production of synthetic fuels. This significantly improves CO_2 performance by 80% or more, depending on the production process. The big advantage of sustainable aviation fuel (SAF) is that it is a "drop-in" fuel, in other words, no technical modifications to the aircraft, engine or airport infrastructure are necessary. In initial trials, SAF has also shown considerable potential to reduce condensation trails and their climate impact. SAF is therefore the technology that could bring a direct improvement in the climate impact of the present fleet. MTU Aero Engines is involved in research into SAF through its membership of the Bauhaus Luftfahrt research institute in Munich and aireg – Aviation Initiative for Renewable Energy in Germany e.V., which is based in Berlin. This not-for-profit initiative, where MTU leads the Fuel Utilization Working Group, is promoting the availability and use of renewable energies in aviation to enable the sector to achieve its ambitious carbon reduction targets.

From the present viewpoint, the fields in which MTU currently operates will not be affected by actual substitution risks in the foreseeable future in terms of maturity level and aviation regulations (focus on emergency response). Nevertheless, MTU will continue to keep a close eye on developments in the field of electric motors, batteries and, especially, fuel cells, and compile further studies so it can react and, above all, participate in a timely fashion. In parallel, MTU is permanently working to improve the efficiency of conventional engines, thus continuously raising the ecological and economic access barriers for any substitute products. In addition to the substitution risks, risks could arise from climate-related regulations in the future which, in turn, would have to be offset by gradual efficiency improvements in existing engine and fuel technology. At present from MTU's perspective, there are no indications of specific activity by the international regulatory authorities. Nevertheless, MTU is carefully monitoring developments in its field and will examine any emerging regulatory activities to identify potential strategic risks.

This assessment is flanked by proactive measures to ensure a seamless transition to the climate-neutral provision of MTU products and services. These measures are set out in the ecoRoadmap, which MTU has been rolling out stepwise since 2020. The funding necessary to realize the planned measures is included in full in the multi-year corporate planning which forms the basis for the forward-looking information for the financial statements. To manage and further improve the activities, MTU continuously monitors greenhouse gas emissions in the production and maintenance of engines and modules at its sites using the recognized international Greenhouse Gas (GHG) Protocol. MTU aims to permanently reduce CO_2 emissions or provide high-quality compensation for unavoidable emissions. To make the climate impact of MTU even more transparent for stakeholders, the company takes part in the annual rating by the international non-profit organization CDP, which collects data on greenhouse gas emissions, climate risks, and climate strategies from companies once a year. All in all, MTU considers the climate change risks to be manageable, especially in light of the measures taken to control them.

Further details are presented in the section entitled "Climate change" in the risk report of the management report.

In regard to the uncertainty surrounding estimates in corporate planning, boosted further by climate change and macroeconomic factors, sensitivity data on impairment risks is provided in *Notes "14 Intangible assets and property, plant and equipment"* and *Note17 "Acquired program assets, development work and other assets"* in the Notes to the consolidated financial statements.

II. Notes to the consolidated income statement

1. Revenue

Revenue developed as follows in the reporting period:

[T60] Revenue

in € million	Revenue recognized at a point in time	Revenue recognized over time	Jan. 1 to Dec. 31, 2022	Revenue recognized at a point in time	Revenue recognized over time	Jan. 1 to Dec. 31, 2021
Commercial engine business	1,335		1,335	1,066		1,066
Military engine business	328	168	496	315	167	482
Commercial and military engine business (OEM)	**1,663**	**168**	**1,831**	**1,381**	**167**	**1,547**
Commercial maintenance business (MRO)	**125**	**3,491**	**3,616**	**104**	**2,637**	**2,741**
Consolidation	–65	–52	–117	–53	–48	–101
Total revenue	**1,723**	**3,607**	**5,330**	**1,432**	**2,756**	**4,188**

Revenue included €558 million (previous year: €398 million) in connection with contract liabilities deferred at the beginning of the year.

Furthermore, revenue of €16 million recognized in the reporting period (previous year: €17 million) related to performance obligations satisfied in prior periods.

The Group generates its revenue in the following geographical areas:

[T61] Revenue according to customer's country of domicile

in € million	2022	2021
Germany	762	616
Europe (excluding Germany)	397	266
North America	3,716	3,015
Asia	201	166
Other regions	255	124
Total revenue	**5,330**	**4,188**

In the reporting period, approximately 70% (previous year: 72%) of MTU's revenue was generated from business with customers in North America, with the US market accounting for a share of 64% (previous year: 68%).

The cumulative transaction price, including estimated variable components, attributable to the unfulfilled performance obligations as of December 31, 2022, i.e., the order backlog, corresponds to an amount of €22.3 billion (previous year € 22.2 billion). Of this cumulative transaction price, €3.5 billion will be realized in revenue within one year, €10.5 billion will be realized in revenue within two to five years, and €8.1 billion is expected to be realized in revenue after five and within 25 years.

A more detailed presentation of revenue, broken down by external and intersegment revenue and their attribution to major customers, is provided in the *Consolidated segment report*. Additional information can be found in the *disclosures relating to operating results in the Combined management report.*

2. Cost of goods sold

[T62] Cost of goods sold

in € million	2022	2021
Cost of materials	-3,424	-2,688
Personnel expenses	-778	-701
Depreciation and amortization (incl. impairment losses)	-293	-295
Other cost of goods sold	-46	33
Cost of goods sold	**-4,541**	**-3,650**
Capitalized development costs	66	49
Total cost of goods sold	**-4,475**	**-3,601**

The cost of goods sold increased as a result of the higher volume of business but not as fast as the rise in revenue. While the U.S. dollar exchange rate trend and inflation effects caused prices to increase, economies of scale realized in relation to the utilization of production and service capacities had the opposite effect compared to the previous year, which was particularly impacted by the effects of the COVID-19 pandemic. This development is driven by the recovery of business performance in both segments as the restrictions on international travel put in place in response to the COVID-19 pandemic are gradually reversed. Consideration should still be given to the product mix realized in both segments relative to the previous year, which contributed in particular to margin improvement in the OEM segment.

Impairment losses amounting to €77 million (previous year: €76 million), of which €59 million are related to the Russia/Ukraine war special item, were included in the cost of goods sold in the reporting period. A substantial share of the impairment losses result from the discontinuation of activities under the PW1400G-JM engine program – the engine for the Russian Irkut MC-21 – and lower planned sales in the GE T408 program – the engine for the Sikorsky CH-53K cargo helicopter – and particularly also as a result of the decision made by the German armed forces to select the alternative Boeing product CH-47F, which was announced in the reporting period.

All in all, compared to the previous year, gross profit was higher, and the gross margin, which is defined as the ratio of revenue less cost of goods sold to revenue, improved from 14.0% in the previous year to 16.0% in 2022. It should also be considered that billing in U.S. dollars is customary in the aviation sector. In 2022, revenue development was supported by the dynamic development of the U.S. dollar exchange rate, which averaged U.S.$/€1.05 in 2022 compared with U.S.$/€1.18 in the previous year.

In contrast, the measurement of refund liabilities within the scope of stakes in commercial engine programs (OEM) on the basis of the closing rate, which particularly affects revenue, had a negative effect considering the change in the exchange rate prevailing at the closing date from U.S.$/€1.13 on December 31, 2021, to U.S.$/€1.07 on December 31, 2022.

3. Research and development expenses

Company-funded research and development expenses developed as follows:

[T63] Research and development expenses

in € million	2022	2021
Cost of materials	-65	-52
Personnel expenses	-37	-29
Depreciation and amortization	-2	-2
Other development costs	-2	-1
Research and development expenditure	**-106**	**-84**
Capitalized development costs		1
Research and development expenses recognized in profit or loss	**-106**	**-83**

More information is given in the *"Research and development" section of the Combined management report.*

4. Selling expenses

[T64] Selling expenses

in € million	2022	2021
Cost of materials	-27	-22
Personnel expenses	-76	-73
Depreciation and amortization	-2	-2
Other selling expenses	-38	-28
Total selling expenses	**-143**	**-124**

Selling expenses comprise expenses for marketing and advertising, media relations expenses, as well as impairment allowances and impairments of receivables from customers and contract assets. The increase in other selling expenses is related to the Russia/Ukraine war special item. Risk provisions in the form of impairment losses on contract assets and trade receivables in particular had to be increased in the reporting period in light of the development of credit loss risks in the Ukrainian and Russian sales markets. Further information on valuation allowances can be found in *Note 20 "Trade receivables"* and *21 "Contract assets."*

5. General administrative expenses

[T65] General administrative expenses

in € million	2022	2021
Cost of materials	-12	-9
Personnel expenses	-76	-64
Depreciation and amortization	-4	-3
Other administrative expenses	-19	-15
Total general administrative expenses	**-111**	**-92**

General administrative expenses are expenses incurred in connection with administrative activities that cannot be directly allocated to development, production or sales activities.

6. Other operating income and expenses

[T66] Other operating income and expenses

in € million	2022	2021
Income		
Gains from the disposal of intangible assets and property, plant and equipment	0	1
Income from insurance cases	1	1
Hedge income (foreign exchange risk, hedging)	8	2
Rental income from property owned by MTU	2	2
Rental income from sublet property owned by third parties	0	0
Income from public sector grants and assistance	0	7
Deconsolidation gain		13
Miscellaneous other operating income	11	14
Total other operating income	**23**	**41**
Expenses		
Losses from the disposal of intangible assets and property, plant and equipment	-0	-1
Expenses from insurance cases	-1	-2
Hedging costs (foreign exchange risk, hedging)	-47	-51
Rental payments for sublet property	-1	-1
Sundry other operating expenses	-23	-3
Total other operating expenses	**-72**	**-57**
Net other operating income/ expenses	**-50**	**-16**

The increase in other operating expenses in the fiscal year is due in particular to the definition of risks of legal action and lawsuits in consideration of claims for cancellation fees from a former fleet maintenance contract customer (MRO segment).

In the previous year, deconsolidation gains of €13 million were recognized from the sale of Vericor Power Systems LLC in August 2021.

7. Profit/loss of companies accounted for using the equity method and of equity investments

[T67] Profit/loss of companies accounted for using the equity method and of equity investments

in € million	2022	2021
Profit/loss of companies accounted for using the equity method		
Associates	9	43
Joint ventures	51	38
Total profit/loss of companies accounted for using the equity method	**60**	**81**
Profit/loss of equity investments		
Program management and coordination companies	1	1
Other related companies	2	2
Total profit/loss of equity investments	**3**	**2**

The favorable business development of the joint ventures MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China, and EME Aero Sp.z.o. o., Jasionka, Poland, was the principal driver of the profit/loss of companies accounted for using the equity method in 2022. The profit trend of the associate PW1100G-JM Engine Leasing LLC., East Hartford, CT, USA, had the opposite effect. Specifically, this had been promoted by necessary asset impairments in connection with the Russia/Ukraine war.

Information on companies accounted for using the equity method is provided in *Note 16 "Financial assets."*

8. Net interest income/expense

[T68] Net interest income/expense

in € million	2022	20201
Interest income	**7**	**1**
Interest expense		
Bonds and notes	-20	-20
Convertible bonds	-4	-4
Liabilities to banks	-1	-1
Lease liabilities	-4	-4
Other interest expense	-3	-5
Capitalized borrowing costs for qualifying assets	3	4
Interest expense	**-29**	**-30**
Net interest income/expense	**-22**	**-29**

The year-on-year increase in interest income is mainly due to the general increase in interest rates. The borrowing costs capitalized in the reporting period relate to qualifying assets acquired or constructed mainly in connection with the Group's stake in the PW800 engine program and the new construction of buildings at the Munich site. The capitalized amount was determined using a cost of debt of 2.3% (previous year: 2.3%).

9. Other financial income/expense

[T69] Other financial income/expense

in € million	2022	2021
Effects of currency translation: exchange rate gains/losses on		
currency holdings	-1	9
financing transactions	3	1
lease liabilities	-5	-6
Fair value gains/losses on derivatives		
Currency derivatives (Exchange rate risks/Hedging)	-9	-1
Commodity forwards	6	2
Interest included in measurement of assets and liabilities		
Pension obligations and plan assets	-11	-6
Receivables, other provisions and liabilities	-5	-12
Miscellaneous other financial income/expense	0	3
Other financial income/expense	**-23**	**-10**

The effects from measurement of foreign currency holdings mainly relate to the change in the U.S. dollar exchange rate prevailing on the reporting date from U.S.$ 1.13 to U.S.$ 1.07 to the euro in the reporting period. For information on the impact of pensions and plan assets, please refer to *Note 25 "Pension provisions."*

10. Income taxes

Recognized income taxes comprise current income taxes paid or payable in the countries in which the Group operates, and deferred tax income or expense.

[T70] Analysis of current and deferred income taxes

in € million	2022	2021
Tax expense incurred in current period	-179	-52
Tax expense (-)/tax income incurred in prior periods	-14	-13
Current income taxes	**-192**	**-64**
Deferred tax expense (-)/tax income resulting from temporary differences	56	-21
Deferred tax expense (-)/tax income resulting from tax credits	7	2
Deferred tax expense (-)/tax income resulting from tax losses carried forward	0	-1
Deferred income taxes	**63**	**-20**
Income tax expense	**-130**	**-84**

Tax reconciliation

As a basic principle, deferred tax assets and liabilities are measured using the applicable tax rate for the period when the asset is realized or the liability is settled, based on current tax legislation in the countries concerned.

In the reporting period, as in the previous year, the deferred taxes of the German Group companies were measured using a regular income tax rate of 32.2%. The income tax rate for the domestic tax group of MTU Aero Engines AG is still comprised of the uniform corporation tax rate of 15.0% plus a solidarity surcharge of 5.5% on the calculated corporation tax expense and takes into account an average municipal trade tax rate of 16.4%.

The deferred taxes of companies outside Germany were each determined on the basis of the relevant tax rates for the countries in question, which range between 15% and 27%.

Information on changes in deferred tax assets and liabilities is provided in *Note 34 "Deferred taxes."*

The following table shows the reconciliation of expected tax expense to recognized tax expense:

[T71] Tax reconciliation

in € million	2022	2021
Earnings before income taxes	463	315
Income tax rate	32.2%	32.2%
Expected tax expense	**-149**	**-102**
Impact of		
Recognition and measurement adjustments and write-downs on deferred tax assets	3	-1
Non-tax-deductible operating expenses and tax-exempt income	-4	-2
Lower tax rates for companies outside Germany	2	10
Investments accounted for using the equity method	12	5
Tax audit and prior periods	1	6
Tax credits available for carry-forward	4	2
Withholding tax charge and other foreign taxes	-2	-1
Other impacts	2	-2
Income tax expense	**-130**	**-84**
Effective tax rate	**28.1%**	**26.7%**

11. Earnings per share

To determine diluted earnings per share, the number of common shares that could potentially be issued through the granting of equity instruments is added to the weighted average number of outstanding shares.

The net income available for distribution to shareholders of MTU Aero Engines AG amounted to €331 million (previous year: €222 million).

In the reporting period, the weighted average number of outstanding shares was 53,366,518 (previous year: 53,325,298 shares). Based on these parameters, basic earnings per share amounted to €6.21 (previous year: €4.17).

Diluting effects arose from 1,707,201 shares (previous year: 1,739,437 shares) that could potentially be issued through the convertible bonds issued by MTU, which meant that diluted earnings per share amounted to €6.06 (previous year: €4.09).

12. Additional disclosures relating to the income statement

Reconciliation of the consolidated income statement

The following reconciliation of the consolidated income statement serves to factor special items out of the key earnings figures of the Group and its business segments. In this way, the success of managing operating activities is measured. The adjusted earnings figures also support comparability over time, and between MTU and other companies.

[T72] Reconciliation of the consolidated income statement

	2022			2021		
in € million	As reported	Non-recurring items	After adjustment	As reported	Non-recurring items	After adjustment
Revenue	**5,330**		**5,330**	**4,188**		**4,188**
Cost of goods sold	-4,475		-4,475	-3,601		-3,601
thereof: special item effects of purchase price allocation		20	20		21	21
thereof: special item effects from increase in the stake in IAE/V2500		23	23		23	23
thereof: special item impairment losses		24	24		83	83
thereof: special item impairment losses (Russia/Ukraine war)		63	63			
Gross profit	**855**	**129**	**984**	**586**	**127**	**713**
Research and development expenses	-106		-106	-83		-83
Selling expenses	-143		-143	-124	0	-124
thereof: special item impairment losses (Russia/Ukraine war)		12	12			
General administrative expenses	-111		-111	-92		-92
Other operating income and expenses	-50		-50	-16		-16
thereof: change of consolidation scope					-13	-13
Profit/loss of companies accounted for using the equity method	60		60	81		81
thereof: special item impairment losses (Russia/Ukraine war)		6	6			
Profit/loss of equity investments	3		3	2		2
Earnings before interest and taxes (EBIT)	**508**	**147**	**655**	**355**	**114**	**468**
Net interest income/expense	-22		-22	-29		-29
Other financial income – interest included in the measurement of pensions	-11		-11	-6		-6
Other financial income/expense – miscellaneous (e.g. measurement of foreign currency holdings)	-12	12		-4	4	
Earnings before income taxes	**463**	**159**	**622**	**315**	**118**	**433**
Income taxes	-130		-130	-84		-84
Adjustment based on normalized income taxes		-16	-16		-7	-7
Net income	**333**	**143**	**476**	**231**	**111**	**342**

In the interests of ensuring comparability of the EBIT figure, it is regularly adjusted for the following special items: Firstly, the contributions resulting from the recurring "effects from purchase price allocation," the "effects from the increase in the stake in IAE-V2500" and extraordinary effects such as, in the reporting period, the considerable effects attributable to "impairment losses," "restructuring expenses" and "changes in the consolidated group."

"Effects of the purchase price allocation": As of January 1, 2004, MTU passed into the ownership of Kohlberg Kravis Roberts & Co. Ltd. (KKR), following the latter's purchase of 100% of the MTU shares from the then DaimlerChrysler AG. In the context of the acquisition, assets, liabilities and contingent liabilities were identified in accordance with IFRS 3 and measured at fair value. Since then, the identified intangible assets, in particular, have resulted in substantial amortization. The resulting earnings impacts are eliminated as special items in the reconciliation to adjusted EBIT.

"Effects from the increase in the stake in IAE-V2500": The increase in MTU's stake in the Pratt & Whitney IAE-V2500 program in 2012 was accounted for as the addition of a program asset. Since then, this asset has been amortized over the expected remaining useful life of the program, thereby reducing revenue, and the corresponding earnings impact is eliminated as a special item in the reconciliation to adjusted EBIT.

"Impairment losses": Significant earnings impacts resulting from asset impairment losses, especially in accordance with IAS 36, are eliminated as special items in the reconciliation to adjusted EBIT. In the reporting period, such special items were recognized in connection with the termination of business relationships with Russian partners as a consequence of the war in Ukraine. This affected the stake in the PW1400G-JM program and, to a smaller extent, assets related to the stake in the consortium for the PW1100G-JM aftermarket business and MTU's commercial MRO business. The associated earnings impacts are eliminated as special items in the reconciliation to adjusted EBIT.

In the reporting period, MTU made or agreed to make compensatory payments totaling U.S.$20 million to lessors for a total of four leased engines seized by Russian business partners. MTU has relevant insurance coverage in the form of a contingent hull war insurance policy for these events. As of the date that these financial statements were prepared, the insurance has provided material confirmation of the coverage, however it has made its commitment subject to completion of an audit under sanction law, as is customary. In consideration of its legal advisors, MTU management assesses the risk that the claim to compensation will be rejected as a result of the conditional audit under sanction law as very low. Nonetheless, the claim at issue – taking into account the extremely high accounting thresholds for recognizing insurance claims – will be classified as a contingent receivable and has not been capitalized as of the closing date. The effect on earnings from the election not to capitalize the expected insurance compensation payment is offset as a special item "Russia-Ukraine war" in the calculation of adjusted EBIT and the adjusted net income. The event will be handled analogously in the following year upon receipt of the insurance compensation payment and correspondingly the contribution from this transaction will be adjusted as a special item.

This category also had to take account of impairment losses as a consequence of the expected impact on sales of the GE T408 program – the engine for the Sikorsky CH53-K cargo helicopter; the associated earnings contributions are eliminated as a special effect in the reconciliation to adjusted EBIT. In the previous year, this category contained, in particular, the impairment loss on the stake in the PW1700G and GE/F414 programs.

"Restructuring expenses": Significant earnings impacts due to restructuring measures within the meaning of IAS 37. No such effects had to be recognized in the reporting period or the previous year.

"Changes in the consolidated group": Considerable earnings impacts result from the acquisition, divestment or discontinuation of material investments and processes of a comparable nature. In the previous year, this category contained the deconsolidation gain from the sale of Vericor Power Systems LLC. The corresponding earnings impacts were eliminated as a special item in the reconciliation to adjusted EBIT.

Similarly, the effect of the special items outlined above is eliminated from earnings before income taxes. To establish adjusted earnings before income taxes, net interest income/expense and the interest shares in other financial income/expense connected with provisions for pensions and liabilities from pensions and plan assets are added to adjusted EBIT. All other components of financial income/expense that are influenced by the U.S. dollar exchange rate, such as the effects of exchange-rate hedging, are adjusted.

The adjusted earnings before income taxes is used to determine the adjusted net income. The normalized income taxes are calculated on the basis of the expected average tax rate for the Group of 26%. The profit/loss of companies accounted for using the equity method does not form part of the tax base.

Personnel expenses

Costs by function include the following personnel expenses items:

[T73] Personnel expenses

in € million	2022	2021
Wages and salaries	809	722
Social security, pension and other benefit expenses	145	134
Total personnel expenses	**954**	**856**

Personnel expenses include pension benefits of €13 million (previous year: €13 million). Other social security expenses amounted to €132 million (previous year: €121 million). The increase in wages and salaries is primarily attributable to the increase in active employees. In addition, salary increases and special payments aimed at offsetting inflation in both the non-performance-related components as well as the performance-related components increase personnel expenses.

Number of employees

The average number of persons employed during the fiscal year breaks down as follows:

[T74] Disclosures on the average number of employees

Number	2022	2021
Industrial staff	4,304	4,236
Administrative staff	5,103	4,789
Temporary employees	990	725
Employees in vocational training	317	314
Interns	235	244
Total average number of employees	**10,949**	**10,308**

Group auditor compensation

The fees charged by the Group auditor Ernst & Young GmbH Wirtschaftsprüfungsgesellschaft in 2022 in accordance with Section 314 (1) no. 9 of the German Commercial Code (HGB) amounted to a total of €1,998 thousand (previous year: €1,677 thousand).

[T75] Group auditor compensation

in € thousand	2022	2021
Financial statement auditing services	1,555	1,513
Other assurance services	432	142
Other services	11	22
Total Group auditor compensation	**1,998**	**1,677**

€230 thousand of the total fees related to previous years. The fee for financial statement auditing services primarily related to the audit of the consolidated financial statements and the separate financial statements of MTU Aero Engines AG and its subsidiaries and reviews of the interim financial statements. Other assurance services mainly included the limited assurance engagement on selected non-financial key performance figures and the non-financial statement and the compensation report as well as the EMIR audit.

III. Notes to the consolidated balance sheet

13. Changes in intangible assets and property, plant and equipment

[T76] Changes in non-financial assets – purchase and production costs 2022

in € million	As of Jan. 1, 2022	Currency translation differences	Additions	Transfers	Disposals	As of Dec. 31, 2022
Program assets (purchase price allocation)	670	0	0	–0	0	670
Program-independent technologies (purchase price allocation)	125	0	0	0	0	125
Customer relationships (purchase price allocation)	57	0	0	0	0	57
Rights and licenses	156	–0	7	67	–0	229
Goodwill	386	0	0	0	0	386
Development assets	572	0	53	0	0	625
Prepayments on intangible assets	47	0	0	–47	0	0
Intangible assets	**2,013**	**–0**	**60**	**20**	**–0**	**2,092**
Land, leasehold rights and buildings, including buildings on third-party land	655	1	7	70	–5	727
Technical equipment, plant and machinery	887	0	14	33	–12	922
Other equipment, operational and office equipment	875	–0	180	13	–138	930
Advance payments and construction in progress	236	0	185	–135	0	286
Property, plant and equipment	**2,653**	**1**	**387**	**–20**	**–155**	**2,865**
Total	**4,665**	**0**	**447**	**–0**	**–156**	**4,957**

[T77] Changes in non-financial assets – depreciation/amortization and carrying amount 2022

in € million	As of Jan. 1, 2022	Currency translation differences	Additions	Transfers	Disposals	As of Dec. 31, 2022	Carrying amount as of Dec. 31, 2022
Program assets (purchase price allocation)	467	0	18	-0	0	486	185
Program-independent technologies (purchase price allocation)	125	0	0	0	0	125	0
Customer relationships (purchase price allocation)	53	0	2	0	0	55	1
Rights and licenses	131	-0	15	0	-0	146	83
Goodwill	0	0	0	0	0	0	386
Development assets	108	0	22	0	0	130	495
Prepayments on intangible assets	0	0	0	0	0	0	0
Intangible assets	**885**	**-0**	**57**	**0**	**-0**	**941**	**1,151**
Land, leasehold rights and buildings, including buildings on third-party land	214	-0	26	-0	-5	235	492
Technical equipment, plant and machinery	632	-1	58	-0	-12	677	245
Other equipment, operational and office equipment	556	-0	108	0	-94	569	360
Advance payments and construction in progress	0	0	0	0	0	0	286
Property, plant and equipment	**1,401**	**-1**	**191**	**-0**	**-110**	**1,481**	**1,384**
Total	**2,286**	**-1**	**248**	**0**	**-111**	**2,423**	**2,534**

[T78] Changes in non-financial assets – purchase and production costs 2021

in € million	As of Jan. 1, 2021	Currency translation differences	Changes in the scope of consolidati-on 1)	Additions	Transfers	Disposals	As of Dec. 31, 2021
Program assets (purchase price allocation)	670	0	0	0	0	0	670
Program-independent technologies (purchase price allocation)	125	0	0	0	0	0	125
Customer relationships (purchase price allocation)	57	0	0	0	0	0	57
Rights and licenses	158	1	-11	7	2	-1	156
Goodwill	391	0	-5	0	0	-1	386
Development assets	527	0	-7	51	0	0	572
Prepayments on intangible assets	21	-0	0	26	0	0	47
Intangible assets	**1,950**	**1**	**-22**	**83**	**2**	**-1**	**2,013**
Land, leasehold rights and buildings, including buildings on third-party land	616	4	4	21	16	-7	655
Technical equipment, plant and machinery	821	2	0	25	53	-13	887
Other equipment, operational and office equipment	878	1	-6	96	10	-105	875
Advance payments and construction in progress	154	0	4	159	-81	-0	236
Property, plant and equipment	**2,470**	**8**	**1**	**301**	**-2**	**-125**	**2,653**
Total	**4,419**	**9**	**-21**	**384**	**0**	**-126**	**4,665**

[1] Changes in the consolidated group reflects additions from the initial consolidation of MTU Maintenance Serbia and disposals from the deconsolidation of Vericor Power Systems

[T79] Changes in non-financial assets – depreciation/amortization and carrying amount 2021

in € million	As of Jan. 1, 2021	Currency translation differences	Changes in the scope of consolidation	Additions	Transfers	Disposals	As of Dec. 31, 2021	Carrying amount Dec. 31, 2021
Program assets (purchase price allocation)	449	0	0	18	0	0	467	203
Program-independent technologies (purchase price allocation)	125	0	0	0	0	0	125	0
Customer relationships (purchase price allocation)	51	0	0	2	0	0	53	3
Rights and licenses	132	1	-11	10	0	-1	131	25
Goodwill	0	0	0	0	0	0	0	386
Development assets	58	0	0	49	0	0	108	464
Prepayments on intangible assets	0	0	0	0	0	0	0	47
Intangible assets	**815**	**1**	**-11**	**80**	**0**	**-1**	**885**	**1,128**
Land, leasehold rights and buildings, including buildings on third-party land	193	1	-1	26	-0	-6	214	441
Technical equipment, plant and machinery	585	1	0	58	-1	-12	632	256
Other equipment, operational and office equipment	530	1	-4	100	0	-71	556	319
Advance payments and construction in progress	0	0	0	0	0	0	0	236
Property, plant and equipment	**1,308**	**3**	**-4**	**185**	**-0**	**-90**	**1,401**	**1,251**
Total	**2,123**	**4**	**-15**	**265**	**0**	**-90**	**2,286**	**2,379**

[1] Changes in the consolidated group reflects additions from the initial consolidation of MTU Maintenance Serbia and disposals from the deconsolidation of Vericor Power Systems

14. Intangible assets

Intangible assets comprise program assets, program-independent technologies and customer relationships which were capitalized as part of the purchase price allocation in connection with the acquisition by Kohlberg Kravis Roberts & Co. Ltd. (KKR) on January 1, 2004, of the shareholding in MTU previously held by DaimlerChrysler AG, and acquired goodwill. This item also includes capitalized, internally generated development assets as well as right-of-use assets and licenses, particularly in connection with – mainly technical – software.

In the reporting period, intangible assets totaling €60 million (previous year: €83 million) were recognized, of which €53 million (previous year: €51 million) were own development work, mainly arising in connection with the Pratt & Whitney GTF™ engines and the PW800 engine program.

€56 million (previous year: €79 million) of the amortization expense for intangible assets was recognized in the cost of goods sold; this amount includes impairment losses on internally generated development assets (IAS 36) of €3 million in connection with the Russia/Ukraine war special item. As a result of the war, activities for the engine program PW1400G-JM, the engine for the Irkut MC-21, were terminated (previous year: impairment losses of €33 million as a result of the discontinuation of the activities related to the engine program PW1700G – the engine for the Embraer E175-E2).

Goodwill reported under intangible assets is allocated to the operating segments as follows:

[T80] Goodwill of operating segments

in € million	Dec. 31, 2022	Dec. 31, 2021
Commercial and military engine business (OEM)	304	304
Commercial maintenance business (MRO)	82	82
Total goodwill	**386**	**386**

Goodwill was tested for impairment in the reporting period as in previous years. For information on the basic approach, please refer to the section entitled *"Impairment of intangible assets, property, plant and equipment, acquired program assets and acquired development work"* in *Section I. "Accounting principles and policies."*

The regular impairment testing of the goodwill of the business segments considers the measurement date to be the end of the first half of the year, as in previous years. On this reporting date, the values in use of the business segments were calculated in order to determine their respective recoverable amounts, based on the current operational and strategic set of planned values.

The calculations of the recoverable amounts are based on the following assumptions: The first step involves the use of models to predict future changes in the engine fleet and the corresponding market shares of engines for which MTU holds or expects to hold supply responsibility or that are or will be of significance to its service business, especially in the MRO segment. MTU applies these forecasts systematically as a basis for its revenue and corresponding capacity planning, from which the planned EBIT and cash flows for each of the two operating segments are derived. The outcome of this process is therefore necessarily based on expectations as regards future market shares and growth in the individual markets, the profitability of products as well as macroeconomic developments such as trends in exchange rates, interest rates and commodity prices against a backdrop of decisions related to climate policy and geopolitics. The values in use, and the corresponding carrying amounts, are determined without reference to financing activities.

In the OEM segment, the calculation of cash flow used to determine the value in use is based on average revenue growth in the mid-single digit percentage range in the relevant planning period. The EBIT margin is expected to grow at average rates in the high single-digit percentage range. The weighted cost of capital before taxes (discount rate) applied here was 10.7% (previous year: 12.1%). The decrease in the weighted cost of capital is primarily attributable to a decline in the beta coefficient which more than offset the rise in the risk-free interest rate. Since the detailed planning period in the OEM segment depends on the pricing typical for the commercial industry for the new engine and spare parts businesses, while the multi-year program business cycles are distinguished by the overlapping effects of the Covid-19 pandemic and the geopolitical special effects from Russia/Ukraine war with its macroeconomic implications, the perpetuity is derived from the strategic long-term planning as in previous years. This makes it possible to consider both the low-margin phase for ramping up stakes in newer commercial engine programs as well as the stronger margin phase of the spare parts business in more mature programs. Consequently, the revenue assumption for the perpetuity is derived from the operational detailed planning period – the revenue in 2027 – plus a compound annual growth rate of 0.5% and an annuity. The previously mentioned annuity takes into account the extent to which revenue in the strategic long-term planning exceeds the revenue in the final year of the planning period (plus a growth rate of 0.5%). The operating earnings margin used for the perpetuity is based on a conservative valuation. For this reason, a margin below the average margin used for strategic long-term planning (2028 to 2036) is applied.

For the MRO segment, the detailed planning horizon reflects average revenue growth in the mid single-digit percentage range and EBIT margin growth in the high single-digit percentage range, while the cost of capital before taxes (discount rate) is expected to be 10.6% (previous year: 12.0%). Analogous to the method used in the previous year, the perpetuity for the MRO segment, given the shorter business cycles of the MRO business, was derived from revenue and the EBIT margin of the final year of the detailed planning period (2027) plus a growth rate of 0.5% as in the previous year.

Impairment testing in both operating segments did not result in the need to recognize impairment losses in any of the business segments.

In addition, various sensitivity analyses were also carried out. These indicated no imminent threat of the need to recognize impairment losses for segment activities, even in the case of less favorable assumptions than those applied during the original planning phase for key determining factors. In particular, this means that no need to recognize an impairment loss for the operating segments would be implied by either the increase in weighted cost of capital before taxes to 12.0% or the failure to meet the planned

EBIT by 20%, each under otherwise identical conditions. Based on the current business plan, considering otherwise identical conditions, only if the revenue taken into consideration for calculating the perpetual annuity in the OEM segment fell by more than 36% or the revenue in the MRO segment by more than 43%, this would indicate the need to recognize an impairment loss. In regard to the influence of climate policy-related effects on MTU's business model, further details are provided in *Section I. "Accounting policies and principles – Discretionary scope, measurement uncertainties and sensitivity."*

15. Property, plant and equipment

Through its capital expenditure on property, plant and equipment, MTU aims to expand its production capacity and modernize equipment and machinery to state-of-the-art standards.

In the reporting period, the Group's total capital expenditure on property, plant and equipment amounted to €387 million (previous year: €301 million). Additions to this item also include the recognition of right-of-use assets under leases. Further information is provided in *Note 36 "Leases."*

The depreciation expense on property, plant and equipment is included in the presentation of the following line items: cost of sales €185 million (previous year: €178 million), research and development expenses €2 million (previous year: €2 million), selling expenses 2 million (previous year: €2 million), and general administrative expenses €3 million (previous year: €3 million).

In the reporting year, additions to land, leasehold rights and buildings, including buildings on third-party land, amounted to €7 million (previous year: €21 million) and relate mainly to new buildings and building extensions and to right-of-use assets for real estate leases.

Capital expenditure on technical equipment, plant and machinery totaling €14 million (previous year: €25 million) relates mainly to the purchase of plant and machinery for the capacity expansion in connection with the ramp-up of production of the Pratt & Whitney GTF™ engine family and the GE9X and PW800 engine programs.

The capital expenditure on other equipment and operational and office equipment in the amount of €180 million (previous year: €96 million) and additions to advance payments and construction in progress in the reporting period in the amount of €185 million (previous year: €159 million) relates principally to the expansion of production capacities, mainly in Munich and Hanover, Germany, and in Nova Pazova, Serbia, and the recognition of right-of-use assets for leased office space at the Munich, Rocky Hill and Amsterdam sites.

16. Financial assets

Financial assets accounted for using the equity method

Financial assets accounted for using the equity method in the consolidated financial statements amounted to €628 million at the reporting date (previous year: €611 million).

Associates

PW1100G-JM Engine Leasing LLC, East Hartford, CT, USA, leases out spare engines of the PW1100G-JM series and is the only material investment in an associate included in MTU's consolidated financial statements.

MTU holds an 18% interest in the company, which is accounted for using the equity method for the consolidated financial statements, analogously to the previous years.

The table below provides a summary of the financial data of PW1100G-JM Engine Leasing LLC, East Hartford, CT, USA for the reporting period:

[T81] Summary of financial data of PW1100G-JM Engine Leasing LLC.

in € million	2022	2021
Balance sheet as of Dec. 31		
Current assets	238	141
Non-current assets	1,417	1,462
Current liabilities	78	48
Non-current liabilities	54	40
Equity	1,523	1,514
Share of equity	274	273
Reconciliation to carrying amount	–8	29
Carrying amount of company accounted for using the equity method	266	301
Income statement		
Revenue	396	482
Net income	36	229
Total comprehensive income	**36**	**229**
Group's share in the income	6	42
Dividend received from the company	**58**	**53**

The following table presents the aggregated, unaudited financial information of the associates that are not material when considered separately (further details of shareholdings are presented in Note 38 "Related party disclosures"):

[T82] Aggregated financial information on the non-material associates

in € million	2022	2021
Carrying amount of companies accounted for using the equity method	37	33
Net income	12	11
Total comprehensive income	**12**	**11**
Group's share in the income	2	2

Joint ventures

The joint ventures identified as material in the reporting period are, just as in the previous year, MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China, and Engine Maintenance Europe Aero sp. z o.o., Jasionka, Poland. MTU holds a 50% interest in each of these companies. The material joint ventures are accounted for using the equity method in the consolidated financial statements. MTU Maintenance Zhuhai Co. Ltd. specializes, in the maintenance, repair and overhaul of the V2500, CFM56, LEAP and PW1100G-JM engines and serves the China and Southeast Asia regions.

Engine Maintenance Europe Aero sp. z o.o. focuses on providing maintenance services for the Pratt & Whitney GTF™ engine family, which powers the Airbus A320neo family and the Airbus A220 family along with other aircraft.

The table below provides a summary of the unaudited financial data of the material joint ventures in the MTU Group for the reporting period and the previous year:

[T83] Income statement, statement of comprehensive income and balance sheet information of the material joint ventures

in € million	2022 Engine Maintenance Europe Aero sp. z o.o	2022 MTU Maintenance Zhuhai Co. Ltd.	2021 Engine Maintenance Europe Aero sp. z o.o.	2021 MTU Maintenance Zhuhai Co. Ltd.
Income statement data disclosures				
Revenue	729	1,296	321	967
Depreciation/amortization and write-downs	-19	-12	-15	-9
Interest income		1		0
Interest expense	-11	-11	-5	-3
Income tax credits	9		1	
Income tax expense		-16		-16
Other income and expenses	-717	-1,162	-321	-856
Net income	**-9**	**96**	**-19**	**83**
Other comprehensive income		9		10
Total comprehensive income	**-9**	**106**	**-19**	**93**
Group's share in the income	-5	53	-10	45
Balance sheet disclosures				
Non-current assets	197	179	182	159
Cash and cash equivalents	55	35	11	43
Other current assets	303	946	125	820
Total assets	**555**	**1,159**	**318**	**1,023**
Equity	82	514	51	456
Non-current financial liabilities		230		104
Other non-current liabilities	11		11	
Current financial liabilities	457	299	253	246
Other current liabilities	5	117	3	216
Total equity and liabilities	**555**	**1,159**	**318**	**1,023**
Reconciliation to carrying amount				
Share of equity	41	257	25	228
Reconciliation to carrying amount	0		0	
Carrying amount of companies accounted for using the equity method	**41**	**257**	**26**	**228**
Dividend received from joint ventures		**14**		**28**

The following table presents the aggregated, unaudited financial information of the joint ventures that are not material when considered separately (further details of shareholdings are presented in *Note 38 "Related party disclosures"*):

[T84] Aggregated financial information on the non-material joint ventures

in € million	2022	2021
Carrying amount of companies accounted for using the equity method	27	24
Net income	5	4
Other comprehensive income	0	0
Total comprehensive income	**6**	**4**
Group's share in the income	3	3

Other financial assets

The carrying amounts of other financial assets included in the consolidated financial statements are presented below:

[T85] Breakdown of other financial assets

	Total		Non-current		Current	
in € million	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Financial assets measured at purchase cost	**466**	**234**	**71**	**60**	**395**	**174**
Loans to third parties[1]	60	56	60	56		
Loans to related companies[1]	6		6			
Receivables from employees	1	1	0		1	1
Receivables from suppliers	4	11			4	11
Miscellaneous other financial assets	396	166	6	3	390	163
Financial assets at fair value through other comprehensive income	**4**	**7**	**4**	**7**		
Other interests in related companies	4	7	4	7		
Derivatives without hedging relationship	**5**	**2**	**1**	**0**	**4**	**1**
Derivatives with hedging relationship	**34**	**6**	**24**	**5**	**11**	**1**
Total other financial assets	**510**	**250**	**100**	**72**	**410**	**177**

[1] Included in net financial debt.

Loans to third parties are primarily attributable to the stakes in consortia granting financing for aircraft and engines as part of commercial OEM programs.

The receivables from suppliers primarily include short-term credit notes, e.g., in connection with returned goods, amendments to invoices and trade discounts received.

Miscellaneous other financial assets amounting to €396 million (previous year: €166 million) relate to numerous individual items. The increase reflects mainly prepaid compensation payment components to the consortium leader (OEM) recognized on the balance sheet for the maintenance and repair business for stakes in commercial OEM engine programs and higher receivables from fly-by-hour contracts. For the Russia/Ukraine war special item, the development of credit loss risks in the Ukrainian and Russian sales markets had to be taken into account in 2022 when determining the present values of capitalized compensation payments made within the scope of stakes in consortia in the aftermarket business of commercial OEM programs (e.g., the GTF engine family). In view of the development of program-specific upfront work in the aftermarket segment and the corresponding credit default risk, a negative impact of €59 million (previous year: €3 million) was recognized through the income statement in the reporting period.

Other interests in related companies include the carrying amounts of MTU's investments in companies that are neither fully consolidated nor accounted for using the equity method (for further details of shareholdings see *Note 38 "Related party disclosures.")*

As in previous years, the present value of the derivatives without hedging relationships recognized on the balance sheet serve to hedge operational commodity price risks. As in previous years, the present value of the derivatives with hedging relationships recognized on the balance sheet serve to hedge currency risks and are composed as follows as of the reporting date:

[T86] Derivative financial instruments

	Total		Non-current		Current	
in € million	**Dec. 31, 2022**	Dec. 31, 2021	**Dec. 31, 2022**	Dec. 31, 2021	**Dec. 31, 2022**	Dec. 31, 2021
Forward foreign exchange contracts (Derivates with a hedging relationship)	34	6	24	5	11	1
Nickel forward contracts (Derivatives without a hedging relationship)	5	2	1	0	4	1
Total derivative financial instruments	**39**	**8**	**25**	**5**	**15**	**3**

17. Acquired program assets, development work and other assets

Acquired program assets, development assets

In the reporting period, compensation payments for development work in an amount of €14 million (previous year: €1 million) paid to consortium leaders (OEMs) were capitalized. The total amount of accrued payments for acquired development assets offset against revenue in the reporting period was €10 million (previous year: €8 million). Further, impairment losses of €62 million were recognized on acquired development assets related to the PW1400G-JM engine program (€38 million) and the T408 engine program (€24 million) (previous year: €12 million related to the PW 1700G engine program) as a result of impairment testing due to indications of impairment, as prescribed by IAS 36.

In the reporting period, MTU spent €12 million (previous year: 16 million) on the acquisition of program assets. The total amount of acquired program assets offset against revenue in the reporting period was €38 million (previous year: €38 million). Furthermore, no impairment losses were recognized in 2022 on program assets as a result of impairment testing due to indications of impairment, as prescribed by IAS 36 (previous year: €34 million for PW1700G and F414 engine programs).

The above impairment losses were established for the OEM engine program stakes (cash-generating unit) by comparing the value in use of the engine programs in question, established by a DCF analysis, with the corresponding net program assets, comprising capitalized development work, program assets, compensation payments for development work (acquired development work) and the attributable property, plant and equipment, inventories, contract assets and receivables. Relevant program obligations, especially refund liabilities, were reflected as reductions in this context.

As a result of the negative impact of the Russia-Ukraine war special item in regard to the stake in the PW1400G-JM engine program for the Russian Irkut MC-21 and the lower planned sales volume for the T408 engine program, which serves as the engine in the Sikorsky CH-53K cargo helicopter, MTU recognized corresponding impairment losses through profit or loss totaling €71 million in the fiscal year (previous year: €83 million for the PW1700G and F414 engine programs). Of this amount, €62 million (previous year: €46 million) relate to the acquired program assets, development work and other assets item. Further information on this matter can be found it *Notes 2 "Cost of goods sold" or Note 12 "Additional disclosures relating to the income statement."*

Determining the value in use within the scope of impairment tests requires forecasts, particularly in respect to the respective program sales volume and the associated program gross margin. The weighted average cost of capital used in determining value in use is 8.05% (previous year: 8.2%) after taxes.

In view of the climate policy and geopolitically induced estimation uncertainty, the following has been prepared using flat-rate sensitivity figures in place of alternative sensitivity scenarios which are each associated with a high degree of estimation uncertainty and to this extent would not be suitable for interpretation. The sensitivities assume that all other parameters remain unchanged and therefore do not take into account the interdependency of the parameters and, above all, any countermeasures. Accordingly, the values should be regarded as a theoretical gross risk.

If, assuming the other parameters remain unchanged, the revenue taken into consideration during the corporate planning or the underlying program planning for the engine programs that were impaired as of the reporting date was reduced by 10%, the associated value in use would decrease by €27 million. By contrast, if, assuming the other parameters remain unchanged, the annual gross profit was reduced by 5%, the associated value in use would decrease by €32 million. Finally a 10% increase in WACC after taxes, without any change in the other assumptions, implies that the associated value in use would decrease by €43 million. The reduction of the value in use of these programs implies in each case an impact on earnings as a result of the need to recognize additional impairment losses. More information can be found in *Section I. "Accounting policies and principles – Discretionary scope, measurement uncertainties and sensitivity."*

As a result of the increase in the IAE-V2500 stake, program assets decrease by €10 million (previous year: increase by €15 million). The program asset in question is recognized analogously to IFRIC 1. More information can be found in *Section I. "Accounting policies and principles" under "Acquired program assets and acquired development work."*

Other assets

Other assets include claims for tax refunds amounting to €31 million (previous year: €27 million) in respect of transactional taxes and prepaid maintenance charges, insurance premiums and rents.

18. Deferred tax assets

Deferred tax assets increased by €1 million to €84 million (previous year: €83 million) in the reporting period. Further details are provided in *Note 34 "Deferred taxes."*

19. Inventories

The carrying amount of inventories, taking into account valuation allowances, comprises the following components:

[T87] Inventories

in € million	Change in write-downs	Dec. 31, 2022 Gross amount	Dec. 31, 2022 Write-down	Dec. 31, 2022 Carrying amount	Dec. 31, 2021 Gross amount	Dec. 31, 2021 Write-down	Dec. 31, 2021 Carrying amount
Raw materials and supplies	-1	803	-85	719	737	-83	654
Work in progress	1	520	-18	501	497	-19	479
Finished goods	-6	311	-64	247	263	-58	205
Advance payments		47		47	42		42
Total inventories	**-7**	**1,681**	**-167**	**1,514**	**1,540**	**-160**	**1,380**

Of the total volume of inventories, an amount of €376 million (previous year: €385 million) was considered to be impaired at the reporting date. The impairment losses concern volume and price risks in view of the utilization of inventory. The rise in inventories during the reporting period is also related to the negative impacts to the supply chains relevant to MTU as a result of the COVID-19 pandemic and geopolitical situation. More information on this can be found in the *Section I. "Accounting policies and principles – Discretionary scope, measurement uncertainties and sensitivity."*

20. Trade receivables

[T88] Trade receivables

in € million	Dec. 31, 2022	Dec. 31, 2021
Third parties	536	466
Related companies	574	480
Total trade receivables	**1,110**	**946**

As of the reporting date, the carrying amount of trade receivables includes valuation allowances in the amount of €34 million (previous year: €54 million). Information on changes in the aforementioned impairment losses occurring in the reporting period can be found in *Note 21 "Contract assets."* Further details on trade receivables from to related companies are provided under *Note 38 "Related party disclosures."*

21. Contract assets

The contract assets result from performance obligations that have been satisfied, where receipt of the agreed consideration depends on acceptance of the performance obligation by the customer and the amounts becoming due for payment. Changes in the reporting period were due to the change in the U.S. dollar exchange rate from U.S.$/€1.13 in the previous year to U.S.$/€1.07 at year-end 2022 and an increase particularly in the MRO segment. This is the result of supply chain problems with a simultaneous expansion of business activities.

Valuation allowances on trade receivables and contract assets changed as follows in the fiscal year:

[T89] Valuation allowances

in € million	2022	2021
As of Jan. 1	**58**	**47**
Translation differences		
Transferred		
Additions	9	34
Utilized	-22	-17
Reversed	-5	-6
As of Dec. 31	**39**	**58**

Contract assets account for €6 million (previous year: €4 million) of the reported valuation allowances. The additions to this item in the reporting period are consistent with changes in the credit standing of specific customers (non-payment risk) and country risk classifications (market risk) in the commercial engine business and are predominantly recognized on a case-by-case basis, even in connection with the Russia/Ukraine war special item. The expenses resulting from the derecognition of trade receivables, offset against the corresponding revenue, amounted to €9 million (previous year: €19 million).

As in prior years, all expense and income amounts arising from valuation allowances and the derecognition of existing trade receivables and contract assets are recognized as selling expenses.

In order to minimize the non-payment risk, an active receivables management system is operated both in the OEM segment, supported in particular by the responsible engine consortium leader, and in the MRO segment.

22. Income tax receivables

At the reporting date, income tax receivables amounted to €34 million (previous year: €89 million). €28 million of this amount (previous year: €70 million) comprises income tax receivables in Germany.

23. Cash and cash equivalents

The cash and cash equivalents amounting to €823 million (previous year: €722 million) comprise cash in hand and bank deposits. This item also includes foreign-currency holdings with an equivalent value of €170 million (previous year: €98 million). The increase in foreign currency holdings corresponds to the business performance in the commercial OEM and MRO business – routinely invoiced in U.S. dollars – especially as a result of the gradual reversal of restrictions on international air travel put in place in response to the COVID-19 pandemic. For information on the investment policy, please refer to the section entitled *"Financial situation – Principles and objectives of financial management."*

24. Equity

Changes in Group equity are presented in the consolidated statement of changes in equity.

Subscribed capital

The company's subscribed capital (capital stock) is €53 million and is divided into 53 million non-par-value registered shares. The increase in the reporting period was due to the exercise of conversion options from the convertible bond issued in 2016.

Authorized capital

In accordance with Article 4 (5) of the articles of association, the Executive Board is authorized until April 20, 2026, to increase the company's capital stock by up to €16.0 million, with the prior approval of the Supervisory Board, by issuing, either in a single step or in several steps, new registered non-par-value shares in return for cash and/or contributions in kind (Authorized Capital 2021). Authorized Capital 2021 was adopted in the Annual General Meeting on April 21, 2021; the same resolution annulled the Authorized Capital 2019.

Conditional capital

In accordance with Article 4 (6) of the articles of association, the company's capital stock may be conditionally increased by up to €3,746,888 through the issue of up to 3,746,888 new registered non-par-value shares. The purpose of this conditional capital increase is to issue shares to owners or creditors of convertible bonds and/or bonds with warrants in accordance with the authorization granted to the company under a resolution passed by the Annual General Meeting on April 15, 2015. Shares are issued at a conversion price or warrant exercise price determined on the basis of this authorization.

Until April 14, 2020, the Executive Board was authorized to issue, with the prior approval of the Supervisory Board, bearer and/or registered convertible bonds and/or bonds with warrants (collectively referred to as "bonds") with a total nominal value of up to €500 million. In 2016, MTU made use of this authorization to increase the company's capital stock by issuing a convertible bond with a nominal value of €500 million.

Further, Article 4 (7) of the articles of association stated that the company's capital stock may be conditionally increased by up to €2,600,000 through the issue of up to 2,600,000 new registered non-par-value shares (Conditional Capital 2019). The purpose of this conditional capital increase was to issue shares to owners or creditors of convertible bonds and/or bonds with warrants in accordance with the authorization granted to the company under a resolution passed by the Annual General Meeting on April 11, 2019. Shares were issued at a conversion price or warrant exercise price determined on the basis of this authorization.

The Executive Board was authorized until April 10, 2024, to issue, in a single step or in several steps and with the prior approval of the Supervisory Board, bearer and/or registered convertible bonds and/or bonds with warrants (collectively referred to as "bonds"), with or without maturity date, with a total nominal value of up to €600 million, and to grant the owners of convertible bonds and/or bonds with warrants the right, obligation or option to convert them into registered non-par-value shares of the company representing a stake in the capital stock of up to €2,600,000 under the conditions established for the issue of convertible bonds or bonds with warrants. The bonds could only be issued in return for cash contributions. They could be issued in euros or – to an equivalent value – in any other legal currency, for instance that of an OECD country. They could also be issued by an affiliated company where MTU exercises control. In such cases, and subject to the prior approval of the Supervisory Board, the Executive Board was authorized to act as guarantor for the bonds and to grant the owners of the bonds the right, obligation or option to convert them into new registered non-par-value shares in MTU.

In 2019, MTU made partial use of this authorization to increase the company's capital stock by issuing a convertible bond with a nominal value of €500 million. More details are provided in *Note 28 "Financial liabilities."*

The authorization described above for the Executive Board to issue bonds with a total nominal value of up to €600 million was canceled at the Annual General Meeting on April 21, 2021, to the extent that such authorization had not been used for the €500 million convertible bond issued in 2019. The Conditional Capital 2019 in the amount of €2,600,000 in accordance with Article 4 (7) of the articles of association was also partially withdrawn and now only comprises a partial amount of €1,600,000.

Further, in accordance with Article 4 (8) of the articles of association, the company's capital stock may be conditionally increased by up to €2,600,000 through the issue of up to 2,600,000 new registered non-par-value shares (Conditional Capital 2021). The purpose of this conditional capital increase is to issue shares to owners or creditors of convertible bonds and/or bonds with warrants in accordance with the authorization granted to the company under a resolution passed by the Annual General Meeting on April 21, 2021. Shares are issued at a conversion price or warrant exercise price determined on the basis of this authorization.

The Executive Board is authorized until April 20, 2026, to issue, in a single step or in several steps and with the prior approval of the Supervisory Board, bearer and/or registered convertible bonds and/or bonds with warrants (collectively referred to as “bonds”), with or without maturity date, with a total nominal value of up to €600 million, and to grant the owners of convertible bonds and/or bonds with warrants the right, obligation or option to convert them into registered non-par-value shares of the company representing a stake in the capital stock of up to €2,600,000 under the conditions established for the issue of convertible bonds or bonds with warrants. The bonds may be issued in return for cash contributions only. They may be issued in euros or – to an equivalent value – in any other legal currency, for instance that of an OECD country. They can also be issued by an affiliated company where MTU exercises control. In such cases, and subject to the prior approval of the Supervisory Board, the Executive Board is authorized to act as guarantor for the bonds and to grant the owners of the bonds the right, obligation or option to convert them into registered non-par-value shares in MTU.

Capital reserves

Capital reserves contain premiums from the issue of shares and the equity component (net of proportional transaction costs) of convertible bonds that have been redeemed or are still outstanding.

The issue of new shares as a result of the exercise of options to convert the convertible bond 2016 increased the capital reserves by €2 million in the reporting period (previous year: €12 million).

Capital reserves also include premiums for the issue of own shares in connection with the Restricted Stock Plan (RSP) or the employee stock option program (MAP) or the Stock Matching Plan (SMP) and, previously, the Matching Stock Plan (MSP).

Retained earnings

Retained earnings mainly comprise retained profits generated by the consolidated Group companies on the basis of a resolution by the responsible bodies.

Treasury shares

Purchase of treasury shares in accordance with the authorization granted by the Annual General Meeting on April 11, 2019

The Executive Board of MTU Aero Engines AG, Munich, Germany, is thus authorized by the resolution of the Annual General Meeting of April 11, 2019, to purchase treasury shares with an aggregate nominal value not exceeding 10% of the company’s issued capital stock, as applicable on the date of the resolution, during the period to April 10, 2024, pursuant to Section 71 (1) no. 8 of the German Stock Corporation Act (AktG). At no point in time may the value of the acquired shares, together with other treasury shares in the company’s possession or which are attributed to it pursuant to Section 71a et seq. of the German Stock Corporation Act (AktG), exceed 10% of the company’s capital stock. These shares may be purchased on the stock market or by means of a public offering addressed to all shareholders. The consideration paid for these shares must not be more than 10% above or below the quoted share price, not taking into account any ancillary transaction costs.

Holdings of treasury shares

No shares were purchased in fiscal year 2022 (previous year: 150,000 shares for a total purchase price of €31 million). The average purchase price of the shares purchased in the previous year amounted to €207.97 per share. The shares purchased by MTU in the reporting year and in previous years still serve the purpose of granting shares in connection with the employee stock option program (MAP) and under the Restricted Stock Plan (RSP). In the reporting period, 15,826 shares (previous year: 10,437 shares) were sold to senior executives under to Restricted Stock Plan (RSP). The processing of the employee stock option program (MAP) was adapted in the 2022 reporting period. In terms of its structure, MAP continues unchanged; the shares are granted and sold exclusively through an external service provider since the 2022 reporting year. MTU does not act as buyer or seller of the shares, which is why there is no longer an impact to MTU’s equity.

Accordingly, no further shares have been sold from the holdings of treasury shares under MAP in the reporting period (previous year: 113,885 shares to Group employees, of which 11,114 were sold to eligible senior executives).

Reconciliation of weighted average number of outstanding shares

In fiscal year 2022, the weighted average number of outstanding shares totaled 53,366,518 (previous year: 53,325,298). A total of 53,388,850 shares in MTU Aero Engines AG, Munich, were in circulation as of December 31, 2022 (previous year: 53,355,960 shares). The company held 64,262 treasury shares as of December 31, 2022 (previous year: 80,088 shares).

Accumulated other equity

Accumulated other comprehensive income increased by €129 million to €–216 million (previous year: €–345 million) in fiscal year 2022. This was principally due to actuarial gains from measurement of pension provisions and exchange rate gains from the translation of the financial statements of the foreign entities and was partially offset by the decrease in the fair values of cash flow hedges used in the hedging of foreign currencies due to the valuation at closing date.

The table below shows the income and expenses recognized in other comprehensive income, including the associated deferred taxes:

[T90] Items recognized in other comprehensive income

in € million	2022 Before	2022 income taxes	2022 After	2021 Before	2021 income taxes	2021 After
Translation differences arising from the financial statements of foreign entities accounted for using the equity method	-3		-3	28		28
Translation differences arising from the financial statements of other consolidated foreign entities	20		20	34		34
Translation differences arising from the financial statements of foreign entities	**16**		**16**	**62**		**62**
Actuarial gains/losses on pension obligations and plan assets	223	-72	151	39	-12	26
Financial instruments designated as cash flow hedges for companies not accounted for using the equity method	-43	13	-30	-150	48	-102
Financial instruments designated as cash flow hedges for companies accounted for using the equity method	-4		-4	-3		-3
Changes in the fair value of equity investments				-6		-6
Income and expense recognized in other comprehensive income	**192**	**-58**	**134**	**-59**	**35**	**-24**

Disclosures relating to capital management

MTU strives to maintain a strong financial profile in the interests of assuring the company's continuation as a going concern and its financial flexibility, as well as ensuring confidence on the part of its shareholders and lenders. As part of its capital management, the company observes the statutory requirements on capital maintenance. Formally, there are no further statutory capital requirements. MTU considers itself obligated to maintain its credit rating of at least Baa3 from Moody's or BBB- from Fitch or S&P.

Based on this, the dividend policy is generally aligned with a distribution between 30% and 40% of the adjusted annual net income (see *Note 12 Additional disclosures relating to the income statement – Reconciliation of the consolidated income statement"*) to shareholders if the financial situation permits and the corporate bodies approve. The Group's capital management activities are focused on optimizing the balance between equity and net financial debt, profitable growth of the business and free cash flow or available liquidity. A description of the financial indicators MTU is obliged to meet in the context of its liabilities to banks can be found in *Note 28 "Financial assets."*

25. Pension provisions

Defined benefit plans and defined contribution plans are in place for MTU employees. For Group companies in Germany, these benefits are financed primarily by provisions recognized in the financial statements, which are covered only to a small extent by plan assets. In contrast, MTU Maintenance Canada Ltd., Richmond, Canada, has a funded retirement benefit plan.

Defined contribution plans

Since January 1, 2007, no direct pension commitments have been granted to new employees in Germany other than senior executives. Instead, MTU paid contributions in the amount of €4 million in the reporting period (previous year: €3 million) to an external pension fund for employees who joined the company after that date. In addition, MTU provides direct insurance contracts funded by employee contributions.

Employer's contributions to the state pension scheme in fiscal year 2022 totaled €55 million (previous year: €52 million).

Defined benefit plans

The pension obligations of MTU are measured using the projected unit credit method in accordance with IAS 19, taking account of future salary and pension increases and other adjustments expected to be made to benefits and pension plans. The provision for defined benefit plans recognized in the balance sheet corresponds to the present value of the benefits payable for current and past service (the defined benefit obligation) of beneficiaries less the fair value of plan assets at the reporting date. An extensive actuarial analysis is carried out annually for each pension plan by independent actuaries.

Actuarial gains or losses may arise in connection with increases or decreases either in the present value of the defined benefit obligation or in the fair value of plan assets. Causes of actuarial gains or losses include the effect of changes in measurement parameters, changes in the assessment of risks on pension obligations, and differences between the actual return on plan assets and the proportional share of interest on the net liability.

In order to calculate the funding status and the pension obligation recognized, the present value of unfunded and funded obligations is offset against the fair value of the plan assets. In Germany, there are no legal or regulatory minimum funding requirements.

The present value and funding status of the defined benefit obligation is as follows:

[T91] Present value of defined benefit obligation (DBO)

in € million	Dec. 31, 2022	Dec. 31, 2021
Present value of unfunded pension obligations	707	948
Fair value of plan assets	-0	-0
Total Germany	**707**	**948**
Present value of funded pension obligations	22	28
Fair value of plan assets	-23	-28
Total other countries (negative value = plan asset surplus)	**-1**	**-0**
Recognized pension obligations (net)	**706**	**948**

The following parameters were applied to measure the pension obligations as of December 31 of the respective year and to measure the pension plan expense in the respective reporting period:

[T92] Actuarial assumptions: Germany

in %	Dec. 31, 2022	Dec. 31, 2021
Interest rate for accounting purposes	3.68	0.86
Salary trend	2.70	2.50
Pension trend	2.20	1.80

[T93] Actuarial assumptions: other countries

in %	Dec. 31, 2022	Dec. 31, 2021
Interest rate for accounting purposes	5.25	3.25
Salary trend	3.00	3.00
Pension trend	2.50	2.50

The market yields on high-quality, fixed-interest corporate bonds with similar maturities in Germany increased significantly compared with the previous year. In view of the duration of the obligations, which currently stands at approximately 12 years, pension obligations in Germany were discounted as of December 31, 2022, applying a discount rate of 3.68%. The mortality tables issued by Prof. Dr. Heubeck (RT 2018G) were used to measure the pension plan obligations in Germany. At the foreign Group companies, this was calculated using a discount rate of 5.25% and current country-specific biometric assumptions. The expected salary trend refers to the expected rate of increase in salaries and other compensation, which is estimated based on inflation, the length of service of employees within the Group, as well as other factors. Employee turnover, mortality rates and disability risk were estimated on the basis of statistical data. Further information on this matter can be found in Section I. "Accounting policies and principles – Pension obligations" and I. "Accounting principles and policies – Discretionary scope, measurement uncertainties and sensitivity."

The present value of pension obligations changed as follows in the fiscal year:

[T94] Present value of pension obligations

in € million	2022	2021
Defined benefit obligation as of Jan. 1	**976**	**1,037**
Current service cost	13	13
Past service cost	0	2
Pension plan subscriber contributions	9	4
Interest expense	9	5
Translation differences	-0	2
Actuarial gains (-)/losses (+)		
Financial assumptions	-245	-50
Assumptions based on experience	19	9
Plan settlements/transfers	-30	-20
Pension benefit and capital payments	-22	-25
Defined benefit obligation as of Dec. 31	**729**	**976**

Actuarial losses in connection with financial assumptions correspond in particular to changes in the discount rate as well as salary and pension trends. Those in connection with assumptions based on experience correspond in particular to the empirical behavior of beneficiaries of the company pension scheme when choosing the mode of payment for their company pension entitlements.

The obligations resulting from plan settlements/transfers are attributable to the conversion of pension benefits into fixed-sum payments and the Group's employee turnover rate.

Plan assets changed as follows in the fiscal year:

[T95] Fair value of plan assets

in € million	2022	2021
Fair value as of Jan. 1	**28**	**28**
Interest income on plan assets	1	1
Actuarial gains (+)/losses (-)	-4	-2
Translation differences/transfers	-0	2
Employer contributions	0	0
Pension benefit payments	-2	-2
Fair value as of Dec. 31	**23**	**28**

[T96] Breakdown of plan assets

in %	2022	2021
Acquired pension benefits	67.8	68.8
Fixed-interest securities	25.7	25.0
Shares	6.5	6.2
Total plan assets	**100.0**	**100.0**

The structure of the plan assets is reviewed annually to optimize the risk and return of the assets invested and adjusted if necessary. The statement of principles of the foreign plan assets defines restrictions to be observed when choosing investments; the investment policy was unchanged from previous years.

The expense from defined benefit pension plans and similar obligations recognized in the income statement for the reporting period comprises the following items:

[T97] Expense from defined benefit pension plans and similar obligations

in € million	2022	2021
Current service cost	13	13
Past service cost	0	2
Service cost	**13**	**14**
Interest cost on pension provisions	9	5
Interest income on plan assets	-1	-1
Net interest cost	**8**	**4**
Interest cost on liabilities from pension capital	**3**	**2**
Total expense	**24**	**21**

Current and past service costs are recognized under personnel expenses. The other components of the expense from defined benefit pension plans and similar benefit obligations are included under other financial income/expense. The measurement effects related to actuarial gains and losses are recognized in total comprehensive income as part of other comprehensive income.

Expected future pension benefit payments

For the coming years, the Group expects to settle its pension provisions and liabilities through the following series of payments:

[T98] Expected yearly amount of pension benefit payments

in € million	2023	2024	2025	2026
Expected yearly amount of pension benefit payments	27	29	34	38

The disclosures on the expected payment of pension benefits take into account the method of payment agreed as of the reporting date or, alternatively, the standard contractual terms; in the case of Executive Board members this is normally as pension capital and for other employees payment in installments.

The main actuarial assumptions used to calculate the defined benefit obligation (DBO), apart from the mode of payment, are the discount rate, salary and pension trends, and assumed life expectancy. The following sensitivity analysis shows how the DBO would have been influenced by potential changes in the underlying assumptions:

[T99] Sensitivity analysis of the defined benefit obligation

in € million	2022	2021
Discount rate 50 basis points higher	-35	-56
Discount rate 25 basis points lower	19	30
Pension trend 50 basis points higher	7	11
Assumed life expectancy 1 year longer	9	13

There are interdependencies between certain actuarial assumptions, especially between changes in the discount rate and the expected pension and salary trends. The sensitivity analysis does not take these interdependencies into account.

26. Income tax liabilities

The income tax liabilities comprise German corporation and municipal trade tax plus income taxes for Group companies outside Germany.

[T100] Income tax liabilities

in € million	2022	2021
As of Jan. 1	**9**	**5**
Utilized	-9	-5
Allocated	70	9
As of Dec. 31	**70**	**9**

Income tax liabilities are due within one year.

27. Other provisions

[T101] Other provisions

	Total		Non-current		Current	
in € million	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Warranty obligations and risks from pending losses on onerous contracts	19	24			19	24
Personnel obligations	101	85	14	14	87	71
Obligations relating to restructuring measures	0	7	0	0	0	7
Outstanding invoices	120	107	39	49	81	58
Other liabilities	30	12			30	12
Total other provisions	**270**	**236**	**53**	**63**	**217**	**173**

Non-current other provisions developed as follows:

[T102] Non-current other provisions 2022

in € million	As of Jan. 1, 2022	Transferred	Utilized	Reversed	Allocated	Discount reversed	As of Dec. 31, 2022
Personnel obligations	14	-3	-0		3	-0	14
Obligations relating to restructuring measures	0				0		0
Outstanding invoices	49		-15	-3	8		39
Total non-current other provisions	**63**	**-3**	**-15**	**-3**	**11**	**-0**	**53**

The following cash outflows are expected from the carrying amounts of non-current other provisions:

[T103] Expected cash outflow from non-current other provisions

in € million	Carrying amount as of Dec. 31, 2022	Expected cash outflow 2024
Personnel obligations	14	4
Obligations relating to restructuring measures	0	0
Outstanding invoices	39	11
Total expected cash outflow from non-current other provisions	**53**	**16**

[T104] Expected cash outflow from non-current other provisions

in € million	Carrying amount as of Dec. 31, 2021	Expected cash outflow 2023
Personnel obligations	14	4
Obligations relating to restructuring measures	0	
Outstanding invoices	49	6
Total expected cash outflow from non-current other provisions	**63**	**10**

MTU expects that the above obligations will become due for payment within the next five years.

Current other provisions developed as follows:

[T105] Current other provisions 2022

in € million	As of Jan. 1, 2022	Transferred	Utilized	Reversed	Allocated	Currency translation differences	As of Dec. 31, 2022
Warranty obligations and risks from pending contracts	24	-8	-14	-2	19	0	19
Personnel obligations	71	4	-67	-3	82	-0	87
Obligations relating to restructuring measures	7	-1	-6		0		0
Unpaid invoices/overdue accounts	58	8	-5	-6	26		81
Other liabilities	12	-1	-4	-0	22	-0	30
Total current other provisions	**173**	**3**	**-97**	**-11**	**149**	**-0**	**217**

The cash outflows relating to current other provisions are expected to be realized in the calendar year following the reporting period.

Warranty obligations and risks from pending contracts

The main component of this item of provisions is an amount of €15 million (previous year: €24 million) for liabilities associated with warranty obligations in connection with the delivery of goods and services.

MTU has identified a small amount of onerous contracts in its commercial maintenance business (MRO) in which the unavoidable costs of fulfilling contractual obligations are higher than the expected inflow of economic benefits from these contracts. A provision of €4 million (previous year: €3 million) was recognized to cover the difference.

Obligations relating to restructuring measures

The obligations relating to restructuring measures included in the previous year resulted from the restructuring program initiated in 2020 for a period through the end of 2021. The obligations principally comprised benefits granted to employees to realize pre-retirement part-time working and early retirement arrangements and other agreements on the termination of employment contracts. Upon completion of the restructuring program, no further obligations relating to restructuring measures exist as of the end of the current reporting period.

Personnel obligations

This item includes provisions for long-service awards amounting to €2 million (previous year: €3 million) and provisions for pre-retirement part-time working arrangements based on the collective agreement on phased retirement and related works agreements. On the basis of these agreements, obligations amounting to €13 million (previous year: €13 million) were recognized at the end of the reporting period. The obligation takes account of relevant plan assets amounting to €11 million (previous year: €11 million). The item also includes provisions for profit-sharing bonuses, which amounted to €77 million (previous year: €63 million). They relate to short-term incentive (STI) awards to the Executive Board and senior executives as well as to the bonus for staff not covered by the collective wage agreement and the profit-sharing bonus for employees covered by the collective wage agreement.

The Executive Board members and senior executives receive target direct compensation comprising non-performance-related components (fixed compensation and fringe benefits) and performance-related components. The performance-related components are divided into the STI, as a performance-related component with no long-term incentive effect, and the Restricted Stock Plan, as a performance-related component with a long-term incentive effect.

The STI is based on the extent to which the Group's financial targets are met in the form of adjusted EBIT and free cash flow. The extent to which the respective performance-related target components are met is on a scale of 0% to 200%. How these incentives are paid is controlled by the achievement of non-financial Group targets – ESG targets – which are expressed by a discretionary factor of between 0.8 and 1.2 applied to the performance related distribution.

The Restricted Stock Plan entails a cash payment, which must be immediately re-invested in MTU shares. These shares are subject to a specific vesting period, defined according to the beneficiary's rank in the management hierarchy. The target compensation granted for the purchase of shares essentially depends on the proportionate target direct compensation weighted by an average achievement of the adjusted EBIT group target calculated over a period of several years and, in the case of the Executive Board, also from the relative total shareholder return outperformance of the STOXX Europe Total Market Aerospace & Defense Index by the MTU share calculated over a period of several years.

Detailed explanatory notes on the compensation system for members of the Executive Board are provided in the Management compensation report in the section headed *"The MTU share."*

Outstanding invoices

Outstanding invoices include, in particular, accruals for cost of sales components in the form of outstanding invoices arising in particular from contracts with suppliers and service providers.

In the case of leases where MTU is obligated to meet specific maintenance conditions before returning the aircraft engine, the performance obligations on the reporting date are recognized as a liability. This is measured at the nominal value of the expected future maintenance costs to satisfy the return conditions set out in the lease. These provisions are at times of a long-term nature.

Other liabilities

Changes in other liabilities correspond to the development of risks of legal action and lawsuits (see also *Note 6 "Other operating income and expenses."*) Furthermore, the item includes deferrals of other liabilities which, considered individually, are immaterial.

28. Financial liabilities

[T106] Financial liabilities

in € million	Total		Non-current		Current	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Bonds and notes	605	604	596	595	9	9
Convertible bonds	531	529	485	529	46	0
Financial liabilities to related companies		0				0
Lease liabilities	166	176	109	108	57	68
Other financing liabilities (Financing component)	333	142	288	107	45	35
thereof: arising from new stakes in engine programs	114	142	69	107	45	35
thereof: from compensation payments due to program participations	219		219			
Total gross financial debt	**1,635**	**1,451**	**1,478**	**1,338**	**158**	**113**
Derivatives without hedging relationship	0		0		0	
Derivatives with hedging relationship	128	58	54	30	74	28
Personnel-related financial liabilities	112	111	79	69	33	41
Miscellaneous other financial liabilities	54	44			54	44
Total other financial liabilities	**294**	**212**	**133**	**99**	**161**	**113**
Total financial liabilities	**1,929**	**1,663**	**1,610**	**1,437**	**319**	**226**

Gross financial debt

Bonds and notes

Registered bond

MTU Aero Engines AG issued a registered bond on June 12, 2013, for a total nominal amount of €100 million. The registered bond is repayable on June 12, 2028, and is subject to interest of 3.55% p.a. Interest is payable in arrears on June 12 of each year, for the first time on June 12, 2014. The registered bond, net of transaction costs and including a discount of €3 million, is measured at amortized cost.

Corporate bond

On July 1, 2020, MTU Aero Engines AG issued an unsecured corporate bond with a nominal value of €500 million. On the issue date, the bond has a maturity of five years until July 1, 2025, and is available in units of €1,000. The coupon is 3.0% p.a., payable annually in arrears. At the emission date, the bond was rated by Moody's (Baa3) and Fitch (BBB) and is listed on the regulated market on the Luxembourg Stock Exchange.

Convertible bonds

In 2016, MTU Aero Engines AG issued a senior unsecured convertible bond for a total nominal amount of €500 million. This bond is convertible into registered non-par-value shares in MTU.

The convertible bond has an original maturity of 7 years and is divided into units of €100,000. It bears a nominal interest rate of 0.125% p.a., payable annually in arrears.

Bondholders have been entitled to convert their convertible bonds into common shares of MTU Aero Engines AG at any time since June 27, 2016. The initial conversion price was set at €124.7701, which represents a premium of 50% above the reference rate at the bond issue date.

Under the terms of issue of the convertible bond, MTU has the right to recall the issued bond units at their nominal value (plus accrued unpaid interest) at any time on or after June 16, 2020, subject to a period of notice of minimum 30 days and maximum 60 days, either (i) if the quoted price of the common share rises to or above

130% of the applicable conversion price over a defined period, or (ii) if no more than 20% of the nominal value of the convertible bond issue is outstanding. In the event of such cancellation by MTU, and within the above-mentioned notice period, the bondholders have the right to request that MTU convert their bonds into shares, rather than repurchase them.

Taking into account the partial redemption of bond units in 2019 at a nominal value totaling €275 million and their cancellation as well as the conversion notices received since then from creditors of this convertible bond, the nominal amount outstanding as of December 31, 2022, was still €46 million (previous year: €48 million).

In connection with the aforementioned partial redemption of the convertible bond issued in 2016, MTU Aero Engines AG issued a senior unsecured convertible bond in 2019 for a total nominal amount of €500 million at an issue price of 103%. This bond is convertible into registered non-par-value shares in MTU.

The convertible bond has an original maturity of 7.5 years and is divided into units of €100,000. It bears an interest rate of 0.05% p.a., payable annually in arrears.

Bondholders have been entitled to convert their bonds into common shares of MTU Aero Engines AG at any time from September 18, 2024, onward. The initial conversion price was set at €378.4252, which represents a premium of 55% on the reference rate.

Under the terms of issue of the convertible bond, MTU has the right to recall the issued bond units at their nominal value (plus accrued unpaid interest) at any time on or after April 08, 2025, subject to a period of notice of minimum 30 days and maximum 60 days, either (i) if the quoted price of the common share rises to or above 130% of the applicable conversion price over a defined period, or (ii) if no more than 20% of the nominal value of the convertible bond issue is outstanding. In the event of such cancellation by MTU, and within the above-mentioned notice period of minimum 30 and maximum 60 days, the bondholders have the right to request that MTU convert their bonds into shares, rather than repurchase them.

For information on the effect of transactions with the convertible bonds on the company's subscribed capital and capital reserves, see *Note 24 "Equity"* in the Notes to the consolidated financial statements.

Financial liabilities to banks

Revolving credit facility

The revolving credit facility concluded with five banks and amounting to €600 million and maturing on October 28, 2023, was replaced ahead of schedule in the reporting period by a new revolving credit facility. This credit facility with a volume of €500 million was concluded with nine banks has a term of five years until June 29, 2027, and can be extended twice by one year in each case at the company's request.

This secures the mid-term financial flexibility of the MTU Group. The credit utilized is subject to interest at the customary market reference rate plus an additional margin.

The unused amount of the revolving credit facility is subject to a loan commitment fee.

In the event that the company's credit rating drops below Baa3 at Moody's or BBB- at Fitch or S&P, MTU has undertaken to ensure that MTU's gearing (the ratio of consolidated net financial debt to adjusted EBITDA) will not exceed 3.0 at the end of each respective quarter. At the reporting date, this financial indicator was irrelevant as the company's credit rating was sufficient.

Lease liabilities

Lease liabilities relate to liabilities under leases, particularly from the areas of real estate and engine leasing, recognized using the effective interest rate method. For information on their accounting treatment and a summary of the corresponding capitalized lease assets, please refer *Note 36 "Leases"* in the Notes to the consolidated financial statements.

Miscellaneous other financial liabilities

Financial liabilities arising from acquisition of stakes in programs

This item includes the deferred payment components arising from the increase in the stake in IAE V2500 and the acquisition of stakes in engine programs. These are deemed to represent financing transactions in view of the structure of the underlying agreements. Please refer to *Note 17 "Acquired program assets, development work and other assets"* for the goodwill of program assets.

The purchase price agreement signed by MTU in the fiscal year 2012 in order to increase its stake in the IAE V2500 engine program by 5 percentage points to 16% made it necessary, among other things, to recognize a deferred financial liability contingent upon the number of flight hours performed over the next 15 years by the fleet of V2500 engines in service at the time of the stake increase.

The liability matures in 2027 and, as of the closing date, reflects a nominal amount of U.S.$122 million (previous year: U.S.$168 million), which translates into €114 million (previous year: €148 million) at the exchange rate prevailing at the reporting date. As of December 31, 2022, the carrying amount of the purchase price liability was €108 million (previous year: €138 million) and is included in a hedging relationship for revenue-generating transactions in U.S. dollars.

The other financial liabilities arising from the acquisition of stakes in programs mainly concern financial liabilities from program lifetime-related payments in the form of compensation payments to the consortia leaders independent of engine development work for the acquisition of shares in commercial engine programs.

Compensation payments within the scope of stakes in programs

This item includes operational compensation payments to the consortia leaders in connection with stakes in engine programs. In view of the specific structure of the underlying agreements, some of these are deemed to represent financing transactions for the Group.

In the fiscal year, an agreement was concluded with the OEM Pratt & Whitney to repay the cumulative production-related compensation payments within the scope of MTU's membership in the consortium for the PW1100G-JM engine program by the end of 2021. In previous periods, the abovementioned compensation payment obligation was to be accounted for as a component of current refund liabilities, taking account of the estimations regarding amount and maturity. In addition to a fixed repayment amount of a nominal U.S.$265 million, the agreement concluded with the OEM in the reporting period now reflects a payment plan over six years at a fixed interest rate. Taking account of the closing exchange rate as well as an interest rate in line with the risks and maturities concerned, the amount capitalized under other financial liabilities totals €219 million as of the closing date.

Changes in gross financial debt are shown in the following tables:

[T107] Changes in gross financial debt

			Non-cash items					
in € million	As of Jan. 1, 2022	Deposits and withdrawals	Addition	Interest	Transfer/ other	Currency translation differences	Effect of measure-ment at fair value	As of Dec. 31, 2022
Bonds and notes	604	-19		20				605
Convertible bond 2016	47	-0		0	-2			46
Convertible bond 2019	482	-0		4				485
Financial liabilities to related companies	0	-0						0
Lease liabilities	176	-64	59	5	-16	6		166
Other financing liabilities (Financing component)	142	-36	227	5	-10	5		333
thereof: arising from new stakes in engine programs	142	-36	8	5	-10	5		114
thereof: from compensation payments due to program participa-tions	0	0	219	0	0	0		219
Total gross financial debt	**1,451**	**-118**	**286**	**34**	**-28**	**11**	**0**	**1,635**

[T108] Changes in gross financial debt

in € million	As of Jan. 1, 2021	Deposits and withdrawals	Non-cash items: Addition	Interest	Transfers	Currency translation differences	Effect of measurement at fair value	As of Dec. 31, 2021
Bonds and notes	603	–19		20				604
Convertible bond 2016	60	–0		0	–13			47
Convertible bond 2019	478	–0		4				482
Promissory note	100	–100						0
Other financing liabilities (Financing component) arising from increased or new stakes in engine programs	138	–25	21	4	0	4		142
Financial liabilities to banks								
Note purchase agreement	30	–30		0				0
Financial liabilities to related companies	0		–0					0
Lease liabilities	177	–34	42		–19	9		176
Total gross financial debt	**1,586**	**–207**	**63**	**28**	**–31**	**13**	**0**	**1,451**

Other financial liabilities

Derivatives

The derivatives of €128 million with and without hedging relationships recognized as financial liabilities as of the reporting date (December 31, 2021: €58 million) are used to offset currency and commodity price risks. The increase in liabilities is mainly attributable to a decrease in the fair value of forward foreign exchange contracts due to the development of the U.S. dollar exchange rate as of the reporting date relative to the agreed hedging rates.

Personnel-related financial liabilities

Personnel-related financial liabilities of €112 million (previous year: €111 million) result primarily from pension capital claims of €92 million (previous year: €78 million) arising from direct pension commitments under the company pension scheme.

In addition, obligations under the employee stock option program (MAP) of €12 million (previous year: €12 million), which the Executive Board of MTU Aero Engines AG, Munich, offered again in fiscal year 2022, are also reported here. Under the employee stock option program (MAP), MTU offers all eligible employees within and outside of the collective wage agreement and senior executives the opportunity to invest in MTU shares. At the end of a two-year vesting period, employees within and outside of the collective wage agreement receive a taxable "matching" payment corresponding to 50% of the amount invested by the employee in MTU shares at the beginning of the program. Senior executives receive a taxable "matching" payment at the end of the two-year vesting period corresponding to one-third of the amount individually invested.

The total expense for the "matching" payment in connection with the employee stock option program (MAP) in fiscal year 2022 amounted to €11 million (previous year: €10 million).

Miscellaneous other financial liabilities

This item is used to present numerous liabilities that are immaterial when viewed separately such as customer credit balances.

29. Trade payables

[T109] Trade payables

in € million	Dec. 31, 2022	Dec. 31, 2021
Accounts payable to:		
Third parties	271	162
Related companies	13	3
Total trade payables	**284**	**165**

Trade payables include open purchase invoices and accruals for purchased goods and services. The development of balances corresponds to the operating business close to the reporting date. Accordingly, individual order volumes from the next year were brought forward in view of expected price increases. The total amount of trade payables is due in less than one year.

30. Contract liabilities

The contract liabilities contain advance payments by customers for the delivery of engine modules and components and for maintenance services. In addition to the specific development of the work progress of the underlying customer contracts, changes in the reporting period were related to revenue. The U.S. dollar exchange rate trend from U.S.$/€ 1.13 in the previous year to U.S.$/€ 1.07 at year-end 2022 continues to be a factor.

31. Refund liabilities

[T110] Refund liabilities

	Total		Non-current		Current	
in € million	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Warranty and liability risks	203	269	0	0	203	269
Invoice corrections / subsequent costs	1,838	1,489	0	0	1,838	1,489
Total refund liabilities	**2,041**	**1,758**	**0**	**0**	**2,041**	**1,758**

Refund liabilities from warranty and liability risks are related in particular to obligations to make compensation payments due to participation in consortia for commercial engine programs (OEM).

Refund liabilities often arise from the multi-step invoicing system for commercial engine programs (OEM). Sales typically occur under commercial engine programs in connection with:

/ delivery of new engines to aircraft manufacturers
/ delivery of spare parts to MRO service providers, and
/ provision of repair and maintenance services to airlines and leasing companies,

with reference to the catalog list price. Regular supplementary agreements of the consortium leader (OEM) with its customers serve to regularly grant effective discounts as the program's supplies and services are utilized.

New parts business: series engines are sold at the catalog list price to the aircraft manufacturer which sells the total aircraft – aircraft including engine – to an airline for a total price. The engine program in turn regularly grants the procuring airline a corresponding credit (fleet introductory allowance) for selecting the respective engines for its aircraft. As a consortium partner, MTU participates in this invoicing sequence initially through its share in the sale to the aircraft manufacturer and the subsequent credit to the airline. In regard to revenue realization, the previously mentioned transactions are settled on the income statement by accruing a refund liability through profit or loss.

Spare parts business: spare parts are sold at the catalog list price to the MRO service provider which combines the spare parts with repair and assembly services in the course of performing engine maintenance and repair services and markets this bundled service (shopvisit) to an engine owner or operator (e.g., airline, leasing company). The engine program in turn regularly grants the engine owner or operator procuring maintenance and repair services a corresponding credit (warranty or goodwill) based on the existence of pre-existing damage to or remaining lifecycles of engine parts, etc. As a consortium partner, MTU participates in this invoicing sequence initially through its share in the sale of spare parts to the MRO service provider and the subsequent credit to the aircraft owner or operator. In regard to revenue realization, the previously mentioned transactions are settled on the income statement by accruing a refund liability through profit or loss.

To this extent, the changes in the balances of the refund liabilities correspond to the growth of stakes in commercial engine programs and their revenue structure – share of new engine and spare parts business and their respective profitability. Invoicing in connection with commercial engine programs continues to be regularly carried out in U.S. dollars. Consequently, changes in the exchange rate at the reporting date are a key driver of the measurement of liability balances due to their monetary character.

The refund liabilities from warranty and liability risks fell mainly in relation to the consortium stake in GTF engine programs. Here, the technical improvements to engine components and modules realized in the reporting period and previous years and retrofitting of the engine fleet currently in service improved the assessment of the profitability of the series and aftermarket business compared with previous periods. As a result, the additions to refund liabilities remained lower than their utilization from sales that occurred in previous periods, despite rising sales volumes.

The increase in refund liabilities for invoice corrections/subsequent costs in the reporting period corresponds to the growth in the operational business in 2022 on the heels of the gradual reversal of the restrictions put in place in response to the COVID-19 pandemic. The Russia/Ukraine war special item continues to be relevant for the reporting period. Accordingly, advance payments received in 2022 from the MRO long-term maintenance business with Russian customers amounting to approximately US$123 million were reclassified from the contract liabilities to refund liabilities. As is currently evident, the Group can not continue the underlying contractual relationship and therefore plans to pay out the advance payments received in the previous years, as required by circumstances under sanctions law.

As stated, accounting for the aforementioned refund liabilities requires management to make estimates. There are estimation uncertainties arising from the effects of the COVID-19 pandemic, the climate protection debate as well as geopolitical occurrences, particularly those in connection with Russia's war of aggression in Ukraine, and these need to be considered when making estimates. Given the complexity of these parameters, equally reliable and meaningful sensitivity data does not have to be mapped correctly either for individual engine programs or at company level. For more information, see *Section I. "Accounting policies and principles – Refund liabilities"* and *"Accounting policies and principles – Discretionary scope, measurement uncertainties and sensitivity."*

32. Other liabilities

[T111] Other liabilities

in € million	Total		Non-current		Current	
	Dec. 31, 2022	Dec. 31, 2021	**Dec. 31, 2022**	Dec. 31, 2021	**Dec. 31, 2022**	Dec. 31, 2021
Personnel-related liabilities						
Social security	1	1	0	0	1	1
Other personnel-related liabilities	34	23	0	0	34	23
Other tax liabilities	59	24	0	0	59	24
Other liabilities	14	14	14	9	0	4
Total other liabilities	**109**	**62**	**14**	**9**	**95**	**53**

Personnel-related liabilities
Other personnel-related liabilities in particular concern vacation entitlements and flex-time credits.

Other tax liabilities
The tax liabilities relate to payable wage and church taxes, solidarity surcharges, and transactional taxes.

Other liabilities
Other liabilities concern deferred income.

33. Additional disclosures relating to financial instruments

Carrying amounts, measurement/recognition methods and fair value by measurement category
In the following overview, the carrying amounts of financial instruments are aggregated by measurement category. The information presented also includes separate amounts for each measurement category as a function of the measurement/recognition method applied.

Finally, the carrying amounts of the measurement categories are set opposite the fair values for comparison.

The financial instruments presented in the table that are not within the scope of either IFRS 7 or IFRS 9 relate to personnel-related liabilities and the corresponding plan assets accounted for in accordance with IAS 19.

[T112] Disclosures relating to financial instruments
Carrying amounts, measurement/recognition methods and fair values as of Dec. 31, 2022

in € million	Carrying amount as of Dec. 31, 2022	Amount carried in balance sheet: Measured at amortized cost	Fair value through other comprehensive income	Fair value through profit or loss	Amount carried in balance sheet IFRS 16	Financial instruments not within the scope of IFRS 9 or IFRS 7	Total	Fair value as of Dec. 31, 2022
ASSETS								
Financial assets								
Loans and receivables	466	461				5	466	466
Other interests in related companies	4		4				4	4
Trade receivables	1,110	1,110					1,110	1,110
Derivative financial assets								
Derivatives without hedging relationship	5			5			5	5
Derivatives with hedging relationship	34		34				34	34
Cash and cash equivalents	823	823					823	823
EQUITY AND LIABILITIES								
Refund liabilities	2,041	2,041					2,041	2,041
Trade payables	284	284					284	284
Financial liabilities								
Bonds and notes	605	605					605	593
Convertible bonds (2016 and 2019)	531	531					531	522
Lease liabilities	166				166		166	
Financial liabilities arising from increased or new stakes in engine programs	114	114					114	111
Financial liabilities arising from compensation payments due to program participations	219	219					219	219
Derivative financial liabilities								
Derivatives without hedging relationship	0			0			0	0
Derivatives with hedging relationship	128		128				128	128
Other financial liabilities	166	54				112	166	166

[T113] Disclosures relating to financial instruments
Carrying amounts, measurement/recognition methods and fair values as of Dec. 31, 2021

in € million	Carrying amount as of Dec. 31, 2021	Amount carried in balance sheet: Measured at amortized cost	Amount carried in balance sheet: Fair value through other comprehensive income	Amount carried in balance sheet: Fair value through profit or loss	Amount carried in balance sheet IFRS 16	Financial instruments not within the scope of IFRS 9 or IFRS 7	Total	Fair value as of Dec. 31, 2021
ASSETS								
Financial assets								
Loans and receivables	234	231				3	234	234
Other interests in related companies	7		7				7	7
Trade receivables	946	946					946	946
Derivative financial assets								
Derivatives without hedging relationship	2			2			2	2
Derivatives with hedging relationship	6		6				6	6
Cash and cash equivalents	722	722					722	722
EQUITY AND LIABILITIES								
Refund liabilities	1,758	1,758					1,758	1,758
Trade payables	165	165					165	165
Financial liabilities								
Bonds and notes	604	604					604	659
Convertible bonds (2016 and 2019)	529	529					529	543
Financial liabilities arising from increased or new stakes in engine programs	142	142					142	147
Financial liabilities to related companies	0	0					0	0
Lease liabilities	176				176		176	
Derivative financial liabilities								
Derivatives with hedging relationship	58		58				58	58
Other financial liabilities	154	44				111	154	154

The financial assets and liabilities carried at amortized cost contain cash and cash equivalents, trade receivables, other receivables, trade payables and other liabilities which are generally due within a relatively short time. The carrying amounts of these assets and liabilities therefore correspond approximately to their fair value at the reporting date.

The fair value of the financial assets and liabilities measured at fair value was derived from stock market prices or, alternatively, using a discounted cash flow method.

Classification of fair value measurements of financial assets and liabilities according to the fair value hierarchy

To take account of the relevance of the estimated parameters used in the measurement of financial assets and liabilities measured at fair value, MTU's financial assets and liabilities are allocated to three levels.

The three levels of the fair-value hierarchy are described below, together with their utilization when measuring financial assets and liabilities:

Level 1 quoted prices in active markets for identical assets or liabilities (unadjusted input);

Level 2 prices of assets or liabilities that can be observed directly or indirectly (derived);

Level 3 unobservable inputs used to measure prices of assets or liabilities.

The convertible bonds (2016 and 2019), which are traded on the stock exchange are carried at amortized cost and the corporate bond were assigned to Level 1, the equity investments carried at fair value through other comprehensive income were assigned to Level 3, and all other qualifying financial instruments were assigned to Level 2.

The following tables show the allocation of financial assets and liabilities measured at fair value to the three levels of the fair value hierarchy for 2022 and 2021:

[T114] Classification within the fair-value hierarchy for the 2022 fiscal year

in € million	Level 1	Level 2	Level 3	Total
Financial assets measured at fair value				
Derivative financial instruments		39		39
Other interests in related companies			4	4
Total financial assets		**39**	**4**	**44**
Financial liabilities measured at fair value				
Derivative financial instruments		128		128
Total financial liabilities		**128**		**128**

[T115] Classification within the fair-value hierarchy for the 2021 fiscal year

in € million	Level 1	Level 2	Level 3	Total
Financial assets measured at fair value				
Derivative financial instruments		8		8
Other interests in related companies			7	7
Total financial assets		**8**	**7**	**15**
Financial liabilities measured at fair value				
Derivative financial instruments		58		58
Total financial liabilities		**58**		**58**

The fair value of the derivative financial instruments assigned to Level 2 and the equity investments assigned to Level 3 is measured using a discounted cash flow (DCF) method. In the case of equity investments, internal planning calculations and market data were used to derive the discount rate.

Payment cash flows for financial liabilities

The following tables list the contractually agreed interest and principal payments for the financial liabilities.

[T116] Payment cash flows for financial liabilities 2022

		Cash flow 2023			Cash flow 2024			Cash flow 2025			Cash flow 2026 and subsequent years		
in € million	Carrying amount as of Dec. 31, 2022	Fixed inter-est	Vari-able inter-est	Princi-pal	Fixed inter-est	Vari-able inter-est	Princi-pal	Fixed inter-est	Vari-able inter-est	Princi-pal	Fixed inter-est	Vari-able inter-est	Princi-pal
Refund liabilities	2,041			2,041									
Trade payables	284			284									
Bonds and notes	605	19			19			19		500	11		100
Convertible bonds	531	0		46	0			0			1		500
Miscellaneous other financial liabilities (financing component)	333			45	12		109	8		56	12		123
thereof: arising from new stakes in engine programs	114			45			37			22			11
thereof: from compensation payments due to program participations	219				12		72	8		34	12		112
Lease liabilities	166	5		58	4		35	4		9	26		32
Derivatives with hedging relationship	128			74			47			7			
Other financial liabilities	166			90			19			16			55

[T117] Payment cash flows for financial liabilities 2021

		Cash flow 2022			Cash flow 2023			Cash flow 2024			Cash flow 2025 and subsequent years		
in € million	Carrying amount as of Dec. 31, 2021	Fixed interest	Variable interest	Principal	Fixed interest	Variable interest	Principal	Fixed interest	Variable interest	Principal	Fixed interest	Variable interest	Principal
Refund liabilities	1,758			1,751									8
Trade payables	165			165									
Bonds and notes	604	19			19			19			29		600
Convertible bonds	529	0			0			0		48	1		500
Financial liabilities arising from increased or new stakes in engine programs	142			35			37			33			37
Financial liabilities to banks	0												
Loans from third parties													
lease liabilities	176	1		69	5		21	5		18	32		33
Derivatives with hedging relationship	58			28			21			9			
Other financial liabilities	154			86			16			13			51

These include all financial instruments in the portfolio at the reporting date for which payment terms had been contractually agreed. Amounts reported for derivatives represent net outflows. Amounts denominated in a foreign currency are translated at the exchange rate at the respective reporting date. Variable-rate interest payments on the financial instruments are based on the most recent interest rate fixed prior to the reporting date. Financial liabilities with no fixed repayment date are always assigned to cash flows on the basis of the earliest likely repayment dates.

Within the scope of its partnerships in engine programs, MTU is a party to aircraft financing agreements for the purpose of promoting sales. Such commitments are always made collectively and in favor of the consortium leader (OEM). They are provided in two basic forms: predelivery payments (PDP) and backstop commitments. In both cases, any funds made available to the aircraft purchaser are always transferred directly to the aircraft manufacturer solely by the consortium leader (OEM).

MTU classifies loan commitments granted up to the reporting date totaling a nominal amount, translated into euros, of €776 million (previous year: €746 million) as part of its gross liquidity risk in accordance with the requirements of IFRS 7. However, based on experience, it is considered to be very unlikely that all these nominal loan amounts will actually be utilized to their full extent. This is because the financing terms offered take account of the creditworthiness of the purchaser of the aircraft, based on market practice, through clauses in the credit agreement. The terms for backstop commitments are deliberately prohibitive. In the case of predelivery payments (PDP), the consortium has collateral rights to the aircraft while it is still in production and thus in the possession of the aircraft manufacturer. In the case of backstop commitments, the aircraft is collateral under substantive law. It is to be expected that third parties arrange relevant portions of the financing commitments directly with the purchaser of the aircraft, not least due to the financing conditions.

In addition, as of the reporting date, there were unutilized financing commitments for equity investments in the form of capital contributions or shareholder loans totaling €132 million (previous year: €136 million).

With respect to the notional impact on MTU's liquidity of the financing offers, the company ensures that its credit lines (see Note 28 "Financial liabilities") provide adequate liquidity reserves, even in the unlikely event of all financing offers being taken up at the same time, and considers the possibility of extending these credit lines to back up future financing offers. In the event that loan offers and commitments are utilized, MTU considers the associated liquidity and credit risks to be manageable.

Explanatory comments relating to net gain/loss on financial instruments by measurement category

The tables below show the gains/losses arising from transactions involving financial instruments, aggregated by measurement category, for the reporting period and the previous year. Interest income and expense in connection with financial assets and liabilities that are measured at fair value through profit or loss are not included:

[T118] Net gain/loss on financial assets and liabilities 2022

in € million	from interest	from investments	from remeasurement	Currency translation	Write-down	Net gain / loss 2022
Financial assets measured at cost	5			-54	-17	-66
Financial assets measured at fair value through other comprehensive income		3				3
Financial assets measured at fair value through profit or loss			25			25
Financial liabilities measured at cost	-24		-7	-159		-189
Financial liabilities measured at fair value through profit or loss			-29			-29
Total	**-19**	**3**	**-11**	**-212**	**-17**	**-257**

[T119] Net gain/loss on financial assets and liabilities 2021

in € million	from interest	from investments	from remeasurement	Currency translation	Write-down	Net gain / loss 2021
Financial assets measured at cost	2			155	-19	137
Financial assets measured at fair value through other comprehensive income		3				3
Financial assets measured at fair value through profit or loss			3			3
Financial liabilities measured at cost	-25		-9	-211		-245
Financial liabilities measured at fair value through profit or loss			-3			-3
Total	**-24**	**3**	**-8**	**-56**	**-19**	**-104**

Explanatory comments relating to net interest income/expense

The net interest income/expense on financial assets and liabilities includes interest income from long-term loans and interest expenses arising from bonds and notes, convertible bonds, loan agreements with banks and lease liabilities. The interest relating to financial instruments that are not within the scope of either IFRS 7 or IFRS 9 is recognized in other financial income/expense.

Explanatory comments on net gain/loss from equity investments

The profit contributions from equity investments comprise profit transfers from MTU Versicherungsvermittlungs- und Wirtschaftsdienst GmbH, Munich, Germany, and the military program companies.

Explanatory comments on net gain/loss from remeasurement

The net gain/loss on financial instruments measured at fair value through profit or loss mainly comprises exchange rate gains and losses on derivatives not designated in a hedging relationship and is recognized in other financial income/expense. The amount stated for "financial liabilities measured at amortized cost" mainly results from reversing the discount on this category of financial instruments and is recognized in other financial income/expense.

Explanatory comments on net gain/loss from currency translation

The amounts recognized for currency translation of financial assets and liabilities, measured at cost, result principally from foreign currency measurement of trade receivables, trade payables, and refund liabilities. The amounts relating to receivables are recognized in revenue while the amounts relating to liabilities are recognized in the cost of goods sold.

Explanatory comments on net gain/loss from valuation allowances

Along with recognizing impairment losses and reversing impairment losses, valuation allowances recognized in profit or loss also include write-downs of receivables for which no valuation allowance has previously been recognized.

The gain/loss from remeasurement in connection with valuation allowances for financial assets (particularly trade receivables and contract assets) are recognized in selling expenses.

Further information on the impact on profit/loss can be found in *Section II. "Notes to the consolidated income statement."*

Offsetting financial assets and financial liabilities

The following financial assets and financial liabilities subject to offsetting agreements existed at the reporting date:

[T120] Offset amounts of financial assets and financial liabilities as of Dec. 31, 2022

	(a)	(b)	(c)	(d)	(e) = (c) − (d)
in € million	Gross amounts of recognized financial assets / liabilities	Gross amounts of recognized financial assets / liabilities offset in the balance sheet	Net financial assets / liabilities recognized in the balance sheet	Related amounts not offset in the balance sheet	Net amount
Other assets					
Loans and receivables	466		466		466
Other interests in related companies	4		4		4
Trade receivables	1,483	373	1,110		1,110
Derivative financial assets					
Derivatives without hedging relationship	5		5		5
Derivatives with hedging relationship	34		34	18	17
Cash and cash equivalents	823		823		823
Refund liabilities	2,041		2,041		2,041
Trade payables	657	373	284		284
Financial liabilities					
Bonds and notes	605		605		605
Convertible bonds	531		531		531
Financial liabilities to banks	0		0		0
Lease liabilities	166		166		166
Financial liabilities arising from increased or new stakes in engine programs	114		114		114
Financial liabilities arising from compensation payments due to program participations	219		219		219
Derivative financial liabilities					
Derivatives without hedging relationship	0		0		0
Derivatives with hedging relationship	128		128	18	110
Other financial liabilities	166		166		166

[T121] Offset amounts of financial assets and financial liabilities as of Dec. 31, 2021

in € million	(a) Gross amounts of recognized financial assets / liabilities	(b) Gross amounts of recognized financial assets / liabilities offset in the balance sheet	(c) Net financial assets / liabilities recognized in the balance sheet	(d) Related amounts not offset in the balance sheet	(e) = (c) − (d) Net amount
Other assets					
Loans and receivables	234		234		234
Other interests in related companies	7		7		7
Trade receivables	1,324	378	946		946
Derivative financial assets					
Derivatives without hedging relationship	2		2	2	0
Derivatives with hedging relationship	6		6	6	0
Cash and cash equivalents	722		722		722
Refund liabilities	1,758		1,758		1,758
Trade payables	543	378	165		165
Financial liabilities					
Bonds and notes	604		604		604
Convertible bond	529		529		529
Financial liabilities arising from increase or acquisition of stakes in programs	142		142		142
Financial liabilities to banks	0		0		0
Lease liabilities	176		176		176
Derivative financial liabilities					
Derivatives without hedging relationship	0		0		0
Derivatives with hedging relationship	58		58	8	50
Other financial liabilities	154		154		154

The “Related amounts not offset in the balance sheet” presented in the table refer to financial assets and liabilities arising from derivatives that can be offset against debt if the issuer becomes insolvent.

34. Deferred taxes

Deferred tax assets and liabilities arise on temporary differences between the tax bases of assets and liabilities of the individual Group companies and the corresponding carrying amounts in the consolidated balance sheet. Deferred tax assets were also recognized for tax credits and losses available for carry-forward.

Deferred tax assets and liabilities were recognized in OCI in connection with the subsequent measurement of pension obligations and the corresponding plan assets and in connection with the fair value measurement of derivative financial instruments which were part of an effective hedging relationship, and in respect of the difference between the fair value and initial carrying amounts of the equity components of the convertible bonds.

[T122] Changes in deferred tax assets and liabilities

in € million	Dec. 31, 2022 Deferred tax assets	Dec. 31, 2022 Deferred tax liabilities in equity	Dec. 31, 2021 Deferred tax assets	Dec. 31, 2021 Deferred tax liabilities in equity	2022 Tax income / expense (-) in the income statement	2022 Recognized in equity / OCI
Assets						
Intangible assets		219		216	-3	0
Property, plant and equipment	13	89	11	92	5	-0
Financial assets	1	1		5	6	-0
Inventories	69		61		8	-0
Acquired program assets and development work	77	37	62	42	20	-0
Receivables and other assets	46	4	12	9	39	-0
Total assets	**206**	**350**	**146**	**364**	**74**	**-1**
Equity						
Gains and losses from the measurement of derivatives with hedging relationship	31		18			13
Equity portion of convertible bond		12		12		
Actuarial gains/losses on pension obligations and plan assets	80		152			-72
Total equity	**112**	**12**	**170**	**12**		**-58**
Liabilities						
Pension provisions		26		20	-6	
Other provisions	13	0	6	0	7	-0
Refund liabilities	33		29		5	
Liabilities	98	7	113		-21	-1
Total liabilities	**144**	**33**	**148**	**20**	**-16**	**-1**
Deferred taxes on assets and liabilities	**461**	**395**	**464**	**397**	**58**	**-60**
Tax credits and tax losses available for carry-forward						
Tax credits available for carry-forward	38		36		3	-1
Tax losses available for carry-forward	3		2		1	0
Valuation allowances and unrecognized recoverable tax payments						
Valuation allowances on tax credits carried forward	-8		-11		3	0
Valuation allowances on tax losses carried forward		2		1	-0	-0
Temporary differences for which no deferred tax assets were recognized	-14		-13		-1	0
Total tax credits and losses carried forward	**19**	**2**	**14**	**1**	**6**	**-0**
Deferred tax assets/liabilities before offset	**480**	**397**	**478**	**398**	**63**	**-60**
Offset	-397	-397	-395	-395		
Net deferred tax assets/liabilities	**84**	**0**	**83**	**3**	**63**	**-60**

Please refer to Note 10 "Income taxes" for further information relating to current and deferred income tax assets and liabilities resulting from the balance sheet items listed above and to the tax reconciliation between the expected and recognized tax expense.

Tax assets and liabilities are offset against one another only if they relate to the same type of tax levied by the same tax jurisdiction and are due within the same period.

Deferred tax assets were recognized for deferred tax losses/credits available for carry-forward in the case of the following Group companies:

[T123] Deferred tax assets recognized for tax losses/credits available for carry-forward as of Dec. 31

in € million	USA 2022	Poland 2022	Total 2022	Total 2021
Tax credits available for carry-forward	1	37	38	36
Tax losses available for carry-forward	2	1	3	2
Potential tax impact of tax losses/credits available for carry-forward	**3**	**38**	**41**	**38**
Valuation allowances on tax credits carried forward		–8	–8	–11
Valuation allowances on tax losses carried forward	–2		–2	–1
Deferred tax assets recognized for tax losses/credits available for carry-forward	**1**	**31**	**32**	**25**

USA

Tax losses available for carry-forward at MTU Aero Engines North America Inc., (AENA), Rocky Hill, CT, USA, as of December 31, 2022, relate exclusively to state tax, which after the application of valuation allowances amounted to the equivalent of €5 million (previous year: €7 million).

Furthermore, recoverable tax credits are recognized for the tax types that mainly result from development activities. For these recoverable tax credits, deferred tax assets were similarly recognized.

Poland

MTU Aero Engines Polska sp. z o. o. receives government support through Poland's economic development program by virtue of its location in a special economic zone. Because its business investments help to create jobs, the company has been awarded tax credits in respect of the profits it expects to achieve through its production activities, with separate amounts being accorded each year through to 2026. Deferred tax assets amounting to €30 million (previous year: €23 million) were recognized on the basis of the business investments realized up to the reporting date, taking into account the currently expected earnings from the activities for which tax credits were awarded.

In addition to the activities for which tax advantages are granted, the company also provides services that are subject to normal taxation. In fiscal years 2012 through 2016, this area of business resulted in tax losses, while in 2017 through 2019 taxable profit was generated. In 2020, tax losses were incurred again. Taxable profits were once again generated in 2021 and 2022. The tax losses available for carry-forward as of December 31, 2020, had been fully utilized in 2021.

At the reporting date, there were temporary differences amounting to €73 million (previous year: €66 million) for which no deferred tax assets were recognized, in view of the relevant income expectations for the next five years. The resulting easing tax effect of €14 million (previous year: €13 million) was therefore not taken into account in the calculation of the income tax expense.

Deferred tax liabilities for taxable differences arising from investments in subsidiaries and joint ventures

In accordance with IAS 12, no deferred tax liabilities were recognized for temporary differences amounting to €382 million (previous year: €308 million) that arose in connection with investments in subsidiaries and joint ventures. If, in the future, these differences meet the requirements for recognizing deferred tax liabilities, they would result in a tax liability amounting to €15 million (previous year: €13 million), based on the current tax legislation.

IV. Other disclosures

35. Financial risk

In the ordinary course of business, MTU is exposed to credit risks, liquidity risks and market risks. The objective of financial risk management is to minimize the risks arising from operating activities and the resulting financing requirements through the use of selected derivative and non-derivative hedging instruments.

Risks in connection with the procurement, financing and sale of MTU's products and services are described in detail in the management report. In order to counter financial risks, MTU has put in place an integrated risk management system, which is monitored by the Supervisory Board. The principles of this system aim at promptly identifying, analyzing, and communicating risks and taking countermeasures. Market risks, particularly the net exposure from currency risks and commodity price risks are analyzed in respect of their potential impact on earnings before interest and taxes (EBIT) and on net financial income or expense, and reduced through the targeted use of derivative financial instruments.

Credit risks

MTU is exposed to credit risks arising from its operating activities in both the OEM and MRO segments. The risk situation deteriorated in the reporting period due to the impact of the Russia and Ukraine war. In some cases, customers' credit ratings fell due to difficult refinancing terms.

In view of the importance of managing credit risks, engine and aircraft financing arrangements to which MTU is a party as a result of its engine program and MRO alliances are managed by the central treasury department. Further details on engine and aircraft financing arrangements are provided in *Note 33 "Additional disclosures relating to financial instruments"* and in the *"Risk and opportunity report,"* which forms part of the Combined management report.

Financing transactions in connection with liquidity management, e.g., time deposits or forward foreign exchange contracts, also expose the Group to a certain degree of credit risk. MTU's internal guidelines therefore stipulate that such transactions may only be entered into centrally by the central Treasury department, and only with contracting parties with a credit rating of at least investment grade. Counterparty limits are assigned and monitored on the basis of credit rating and company size. For information on the investment policy, please refer to the section entitled *"Financial situation – Principles and objectives of financial management."*

The maximum credit risk is represented by the carrying amounts of the financial assets recognized in the balance sheet, plus the amount of financial guarantees and loan commitments. The increase in carrying amounts is attributable to lower potential for netting against corresponding liabilities and collateral under substantive law as well as an increase in the MRO segment, in particular, due to supply chain problems with a simultaneous expansion of business activities. The unsecured portions of financial assets were included in the calculation of the expected credit losses using an impairment matrix. For this purpose, the assets were allocated to groups with credit standings A, B and C, for which the respective credit loss rate was determined using published information and/or credit ratings from international agencies:

[T124] Expected credit losses as of Dec. 31, 2022

in € million	Credit standing A	Credit standing B	Credit standing C	Total
Expected credit loss rate	0.07%	1.42%	4.78%	
Gross amount	2,838	146	184	3,168
Expected credit losses	2	2	9	13

[T125] Expected credit losses as of Dec. 31, 2021

in € million	Credit standing A	Credit standing B	Credit standing C	Total
Expected credit loss rate	0.06%	1.26%	3.82%	
Gross amount	2,351	108	211	2,671
Expected credit losses	1	1	8	11

Other than collateralization rights for engine and aircraft financing loans issued, there were no material agreements at the reporting date that could reduce the maximum credit risk. Nonetheless, MTU is exposed to other, proportionate liability risks and therefore potential additional credit risks as a result of its membership in engine consortia. More details are provided in *Note 37 "Contingent liabilities and financial liabilities."*

Market risks

Currency risks

More than 80% of MTU's revenue is generated in U.S. dollars. At least half of this currency risk is naturally hedged by costs settled in U.S. dollars. Most other costs are incurred in euros, and to a lesser extent in Canadian dollars and Polish zloty. Translation differences for the unhedged portion of the portfolio have a direct impact on net income and cash flow.

Hedging strategy

MTU uses a defined hedging model to hedge defined portions of its expected net foreign currency surplus. The purpose is to minimize the impact of the volatility of the U.S. dollar exchange rate on net income and the cash flow. The forward foreign exchange contracts generally used for this purpose are designated as financial instruments to hedge cash flows from expected sales realized in U.S. dollars. The hedge ratio decreases the longer the hedging horizon is.

An economic hedging relationship exists between the hedged item and the hedging instrument, since the terms of the forward foreign exchange contracts and currency options correspond to the terms of the highly probable forecast transactions (this is true for the nominal amount and the expected payment date). MTU uses the hypothetical derivative method to measure the effectiveness of the hedge and prospectively compares the changes in fair value of the hedging instrument with the changes in fair value of the hedged items that are attributable to the hedged risk.

Hedge ineffectiveness can arise for a number of reasons:

/ when the timing of the cash flows from the hedged item and the hedging instruments differs or the expected amount of cash flows from the hedged item and the hedging instrument changes. MTU considers it unlikely that an effective risk could arise from such an event since only the net foreign currency surplus is hedged and sufficient gross foreign currency payments are available to service the hedging instruments.

- different effects of the counterparty credit risk on the changes in fair value of the hedged item and the hedging instrument. MTU believes that this poses a low effective risk because all banks with which MTU enters into hedging transactions and MTU itself must have an investment grade rating. The priced credit risk between MTU and the commercial banks is therefore very low at present and thus immaterial.

Translation differences arising from the translation of financial statements owf international subsidiaries into the Group's functional currency and effects from measurement at the closing rate (translations risks) are not included when deriving the hedging volume.

Forward foreign exchange contracts

As of December 31, 2022, MTU held open forward foreign exchange contracts with maturities up to July 2026 in a nominal amount of U.S.$3,000 million. At the exchange rate prevailing on the reporting date, that translates into €2,813 million. The fair values of the open forward foreign exchange contracts maturing in and after 2023 decreased by €69 million in the reporting period (previous year: decrease by €123 million for maturities in and after 2022). Changes in the value of the hedged item correspond to those of the hedging instrument, so that the hedging instruments were effective. As of December 31 of the previous year, MTU had hedged cash flows for fiscal years 2022 through 2024 amounting to U.S.$2,400 million (which translates into €2,119 million at the exchange rate prevailing on December 31, 2021).

Currency option transactions

The options give MTU the right (long options) or obligation (short options) to sell a defined quantity of U.S. dollars for euros at agreed euro exchange rates at a specific time. The risk of financial loss from a long option is limited to the premiums that have already been paid. In the case of short options MTU collects a premium. Losses can be incurred if the exchange rate at maturity, compared with that agreed when the option was sold, falls by more than the amount of premiums received for these options. As of December 31, 2022, MTU held neither long options nor short options, as in the previous year.

The forward foreign exchange contracts open at the reporting date had the following maturities:

[T126] Cash flow hedges

	Dec. 31, 2022			
	Due in less than 1 year	Due in more than 1 year and less than 2 years	Due in more than 2 years	Total
Forward foreign exchange contracts				
Nominal amounts (in U.S. $ million)	1,400	1,040	560	3,000
Average forward rate (€/U.S. $)	1.13	1.14	1.09	1.13
thereof recognized as				
Financial assets				
Nominal amounts (in U.S. $ million)				1,080
Carrying amounts (in € million)				34
Financial liabilities				
Nominal amounts (in U.S. $ million)				1,920
Carrying amounts (in € million)				128

[T127] Cash flow hedges

	Dec. 31, 2021			
	Due in less than 1 year	Due in more than 1 year and less than 2 years	Due in more than 2 years	Total
Forward foreign exchange contracts				
Nominal amounts (in U.S. $ million)	1,060	900	440	2,400
Average forward rate (€/U.S. $)	1.17	1.18	1.20	1.18
thereof recognized as				
Financial assets				
Nominal amounts (in U.S. $ million)				300
Carrying amounts (in € million)				6
Financial liabilities				
Nominal amounts (in U.S. $ million)				2,100
Carrying amounts (in € million)				58

Hedging instruments designated as cash flow hedges

The liability arising from the deferred purchase price component in connection with the increase in MTU's program share in the IAE/V2500 engine program, which has to be serviced in U.S. dollars, serves as an instrument for hedging cash flows arising from revenue generated in U.S. dollars. This liability matures in 2027 and has a nominal amount of U.S.$122 million (previous year: U.S.$168 million), which translates into €114 million (previous year: €148 million) at the exchange rate prevailing at the reporting date. As of December 31, 2022, the carrying amount of the purchase price liability was €108 million (previous year: €138 million) and is recognized under miscellaneous other financial liabilities (financing component) from the acquisition of stakes in programs as part of the net debt.

As of the reporting date at the end of fiscal year 2022, the following amounts arising from the fair value measurement of forward foreign exchange contracts and other hedging instruments were recognized in equity:

[T128] Impact of hedging relationships on equity

in € million	Hedge reserves	Hedging costs reserves	Currency translation reserves	Total
Carrying amount as of Jan. 1, 2021	**125**	**–56**	**–6**	**62**
Changes in fair value of forward foreign currency sales and options	–233	98		–135
Amounts recycled to profit or loss	50	–59	3	–6
Impacts from currency translation			–12	–12
Deferred taxes	59	–13	1	48
Carrying amount as of Jan. 1, 2022	**0**	**–30**	**–14**	**–43**
Changes in fair value of forward foreign currency sales and options	48	45		93
Amounts recycled to profit or loss	–84	–48	7	–125
Impacts from currency translation			–15	–15
Deferred taxes	12	1	1	13
Carrying amount as of Dec. 31, 2022	**–24**	**–32**	**–21**	**–77**

No transactions were hedged in prior periods that are no longer expected to occur.

As a further element of its hedging strategy, MTU employs derivative financial instruments to which hedge accounting under IFRS 9 is not applied:

Currency swaps

In the course of the 2022 reporting period, U.S. dollars were sold at the daily rate and repurchased after a short time using a swap. As the selling and buying rates differ only marginally, these swaps are immaterial in terms of risk. The purpose of these transactions was to optimize liquidity in U.S. dollars. As of December 31, 2022, currency swaps expiring in the period up to January 3, 2023, with a notional value of U.S.$5 million were concluded (previous year: U.S.$55 million).

Exchange rate sensitivity analysis

The sensitivity analysis showing the effects of hypothetical changes in exchange rates on net income and equity relates to the foreign currency positions included in the respective balance sheet items at the reporting date. In this context, it is assumed that the volume at the reporting date is representative of the full year.

A significant proportion of trade receivables and payables, refund liabilities and finance lease liabilities is invoiced in U.S. dollars and is thus exposed to exchange rate fluctuations. All other non-derivative financial instruments to which hedge accounting is not applied are already denominated in the Group's functional currency (the euro), and are therefore not included in the exchange rate sensitivity analysis. The equity instruments held by the Group are not of a monetary nature and therefore do not present a currency risk as defined by IFRS 7.

If the exchange rate of the euro to the U.S. dollar at December 31, 2022, or at the prior-year reporting date had been 10% higher or lower, this would have produced the following hypothetical effects on net income and equity, particularly due to the effects of measurement of foreign currency receivables and liabilities on the reporting date:

[T129] Exchange rate sensitivity analysis

	2022		2021	
in € million	-10%	+10%	-10%	+10%
Exchange rate sensitivity (€/U.S. $)				
Closing exchange rate Dec. 31, 2022: 1.0666 (Dec. 31, 2021: 1.1326)	0.96	1.17	1.02	1.25
Net income	**–98**	**79**	**–98**	**80**
Equity [1]	**–177**	**147**	**–147**	**128**

[1] After tax.

Interest rate risks

MTU is exposed to interest rate risks directly in connection with new increases in financial liabilities and indirectly in calculating the present values of assets, liabilities and provisions (e.g., program liabilities, goodwill and pension provisions). After deducting present values, MTU is in a net debt position in relation to financial liabilities. The interest rates on financial liabilities are stipulated, while interest income from investing cash and cash equivalents is aligned with the short-term money market indices. MTU has thus limited the existing direct interest rate risk for current liabilities while also benefitting from higher money market interest rates.

Interest rate sensitivity analysis

Interest rate risk is presented in accordance with IFRS 7 using sensitivity analysis, which shows the effects of changes in market interest rates on interest payments, interest income and expense, other income statement items, net income and equity. The interest rate sensitivity analysis is based on the following assumptions:

Changes in the market interest rate of non-derivative financial instruments bearing fixed market interest rates have an effect on net income and equity only if these financial instruments are measured at fair value through profit or loss or were classified as such at initial recognition. Consequently, all fixed-interest financial instruments measured at amortized cost have no interest-rate-induced effects on net income and equity that must be accounted for, apart from future amounts to be charged to net interest income/expense.

In fiscal year 2022, floating-rate financial instruments and financial instruments measured at fair value held at the reporting date were not exposed to any significant interest rate risks.

Price risks

There is a general risk of price increases for commodities. This risk is mitigated mainly by procuring goods with appropriate price agreements and only to a small extent by entering into derivative financial instruments for nickel forward contracts.

As of December 31, 2022, MTU had entered into nickel forward contracts with credit institutions for a volume of 850 metric tons of nickel (previous year: 700 metric tons) for the years 2023 through 2024 and contracted fixed prices for nickel of between U.S.$18.3 thousand and U.S.$31.2 thousand per metric ton (previous year: between U.S.$13.7 thousand and U.S.$18.7 thousand per metric ton).

If the market price for nickel on the respective maturity date exceeds the agreed fixed price, MTU will receive a payment for the difference from the bank. In the opposite case, MTU is obligated to make a payment to the bank. No hedge accounting was applied to these transactions within the meaning of IFRS 9. The change in fair value of €6 million (previous year: €2 million) arising from these forward commodity purchases is recognized in other financial income/expense. Additional information is provided in *Section II. Notes to the consolidated income statement – 9 Other financial income/expense.*

If the market prices in nickel forward contracts had been 10% higher or lower, net income would have been €2 million higher or lower (previous year: €1 million).

Liquidity risks

MTU's liquidity risk relates to its inability to meet payment obligations due including meeting potential obligations related to sales financing measures because of insufficient cash or cash equivalents being available. In order to ensure the solvency and financial flexibility of MTU at all times, long-term credit lines and liquid funds are held available based on multi-year corporate planning and rolling monthly liquidity planning.

Liquidity is invested mainly in demand deposits, money market funds and other short-term money market papers. The maturity profile of invested amounts is based on liquidity planning and considers the availability of a suitable amount of reserves at all times. In addition, MTU has access to a long-term, syndicated credit facility in the amount of €500 million. The liquidity reserves available from credit facilities that have not been drawn down and available cash and cash equivalents reinforce the management in their estimate that the company is adequately prepared in terms of liquidity to ensure solvency in times of business growth and advancement, as well as against a backdrop of multiple crises negatively impacting the macroeconomic environment.

For further information, see the *Notes III. Notes to the consolidated balance sheet – 28 Financial liabilities."* and *III. Notes to the consolidated balance sheet – 33 Additional disclosures relating to financial instruments*. as well as *I. Accounting principles and policies.*

36. Leases

Group as lessee

The Group has entered into leases for land and buildings, technical equipment and machinery, and operational and office equipment. The terms of leases for land and buildings range from two to 33 years. Lease terms for technical equipment, plant and machinery and for motor vehicles and operational and office equipment are typically between two and five years. A number of leases have renewal and termination options as well as variable lease payments, which are explained in detail below.

The Group primarily acts as lessee in the following cases:

- Real estate leases for production, logistics and office capacities (land and buildings). Some of the underlying contracts include price escalation clauses linked to the consumer price index. The lease terms are between two and 17 years; some leases have renewal options.
- Leasing of vehicles and industrial trucks (operational and office equipment). The underlying leases regularly take into account variable components of the lease rates. The lease terms are between two and five years; some leases have renewal options.
- Engine leasing (operational and office equipment): The underlying leases may take into account variable components of the lease rates. The lease terms are between one and ten years; some leases have renewal options. Engines are provided to MRO customers on the basis of sub-leases.

The tables below show the changes in carrying amounts and depreciation expenses of the right-of-use assets recognized in the balance sheet:

[T130] Right-of-use assets 2022

in € million	As of Jan. 1, 2022	Currency translation differences	Additions	Transfers	Disposals	As of Dec. 31, 2022
Purchase cost						
Land, leasehold rights and buildings, including buildings on third-party land	110	0	4	–0		115
Technical equipment, plant and machinery	2					2
Other equipment, operational and office equipment	133	–0	59	0	–73	119
Total purchase cost	**245**	**0**	**63**		**–73**	**236**
Depreciation						
Land, leasehold rights and buildings, including buildings on third-party land	–21	–0	–11	0		–32
Technical equipment, plant and machinery	–2					–2
Other equipment, operational and office equipment	–61	0	–26	–0	44	–43
Total depreciation	**–84**	**–0**	**–37**		**44**	**–77**
Carrying amount	**161**	**0**	**26**		**–29**	**158**

[T131] Right-of-use assets 2021

in € million	As of Jan. 1, 2021	Currency translation differences	Additions	Transfers	Disposals	As of Dec. 31, 2021
Purchase cost						
Land, leasehold rights and buildings, including buildings on third-party land	94	1	16	1	-2	110
Technical equipment, plant and machinery	2					2
Other equipment, operational and office equipment	145	-0	23		-35	133
Total purchase cost	**241**	**1**	**39**	**1**	**-37**	**245**
Depreciation						
Land, leasehold rights and buildings, including buildings on third-party land	-11	-0	-12		3	-21
Technical equipment, plant and machinery	-2					-2
Other equipment, operational and office equipment	-56	0	-25		20	-61
Total depreciation	**-70**	**-0**	**-37**		**23**	**-84**
Carrying amount	**172**	**0**	**2**	**1**	**-15**	**161**

In the reporting period, additions to right-of-use assets in the area of land, leasehold rights and buildings, including buildings on third-party land relate to the lease of space at the Munich site. The maturity analysis for lease liabilities is presented in *Note III. Notes to the consolidated balance sheet – 33 Additional disclosures relating to financial instruments.*

The following amounts for leases were recognized in profit or loss:

[T132] Amounts recognized in profit or loss for leases

in € million	2022	2021
Income		
Income from subleasing right-of-use-assets	51	20
Gains arising from sale and leaseback transactions	1	3
Lease income	**51**	**23**
Expenses		
Depreciation of right-of-use assets	36	37
Impairment losses on right-of-use assets	1	
Interest expense for lease liabilities	4	4
Short-term lease expense	3	5
Low-value asset lease expense	2	2
Variable lease payment expense not included in the measurement of lease liabilities	16	3
Lease expense	**62**	**51**

In the reporting period, the Group's cash outflows for leases amounted to €89 million (previous year: €47 million). Future cash outflows for leases not recognized on the balance sheet are presented below in Note IV. "Other disclosures – 37 Contingent liabilities and financial liabilities."

Group as lessor

MTU leases out engines that are owned by the Group as well as engines that are in turn leased by MTU. The leases generally have terms of between a few weeks and three years. In this context, tailored engine leases are offered by the Group to its customers, especially airlines and the Group offers engine maintenance services. The engines are primarily leased out under operating leases. Renewal and premature termination options are granted on a case-by-case basis.

The maturity analyses of lease receivables are as follows:

[T133] Maturity analysis of finance lease receivables

in € million	Dec. 31, 2022	Dec. 31, 2021
Finance lease receivables		
Less than 1 year		0
1 to 2 years		0
2 to 3 years		
3 to 4 years		
4 to 5 years		
More than 5 years		
Undiscounted finance lease receivables		**0**
Unearned finance income		–0
Unguaranteed residual value		–0
Net investment in finance leases		**0**

[T134] Maturity analysis of operating lease payments

in € million	Dec. 31, 2022	Dec. 31, 2021
Operating lease receivables		
Less than 1 year	16	11
1 to 2 years	3	4
2 to 3 years	2	1
3 to 4 years	1	0
4 to 5 years	1	
More than 5 years	0	
Total	**23**	**16**

Lease revenue of €82 million was earned from operating leases in the reporting period (previous year: €44 million). Divestment gains of €0 million (previous year: €0 million) were recorded in connection with finance leases in 2022.

37. Contingent liabilities and other financial obligations

Contingent liabilities

The following table contains an overview of the contingent liabilities of the MTU Group on the reporting date for 2022 and the previous year.

[T135] Contingent liabilities

in € million	Dec. 31, 2022	Dec. 31, 2021
Contingent liabilities arising from risk- and revenue-sharing agreements	1	6
Bank guarantees	32	57
Guarantees and other contingent liabilities	152	143
Total contingent liabilities	**185**	**207**

Analogously to previous years, bank guarantees and guarantees and other contingent liabilities principally comprise contract fulfillment and customs bonds of a customary amount and guarantees assumed for credit facilities and investment subsidies.

Founded in 2019 and consolidated for the first time in 2021, MTU Maintenance Serbia d. o. o. received public sector grants related to the site's establishment and construction. MTU also receives a small amount of public sector grants and assistance to subsidize new production and logistics buildings and research and development expenses. The risk of repayment obligations exists until such time as the relevant project has been completed and all the conditions associated with it have been met. At the reporting date, the probability that risks of this kind could materialize was deemed to be very low.

In fiscal year 2019, MTU incurred income tax losses due to the partial repayment of a convertible bond in the amount of €276 million. Even though MTU assumes that the losses will be confirmed by the tax audit, reference is made to the potential for a different opinion on the side of the administration.

In addition, as of the reporting date, there were unutilized financing commitments for equity investments in the form of capital contributions or shareholder loans totaling €142 million (previous year: €136 million) and further commitments to OEM customers relating to shares in sales financing commitments in respect of commercial engine programs. As of the reporting date, the unutilized nominal amount of such financing commitments was €776 million (previous year: €746 million). MTU treats these commitments as a component of its gross liquidity risk within the meaning of IFRS 7. Further details can be found in *Note III. Notes to the consolidated balance sheet – 33 "Additional disclosures relating to financial instruments."*

Other financial obligations

Obligations arising from leases

The breakdown by maturity of future cash outflows for leases for which lease liabilities have not yet been recognized is as follows:

[T136] Future cash outflows from leases

in € million	Dec. 31, 2022	Dec. 31, 2021
Leases that have not yet commenced		
Due in less than 1 year	0	0
Due in more than 1 year and less than 5 years	2	0
Due in more than 5 years	2	0
Total future cash outflows from leases	**4**	**1**

Purchase commitments for financial obligations

As of December 31, 2022, purchase commitments amounted to €6 million (previous year: €8 million) for the purchase of intangible assets and to €184 million (previous year: €117 million) for the purchase of property, plant and equipment and were therefore in the normal range for the business.

38. Related party disclosures

Related companies

Transactions between Group companies and joint ventures or associates were, without exception, entered into in the normal course of business and on an arm's length basis.

Transactions between consolidated companies were eliminated in the consolidated financial statements and are therefore not disclosed separately in this Note.

Business with related companies

In the reporting period, intragroup transactions involving the supply of goods and services were conducted by Group companies as part of their normal operating activities (e.g., development, repairs, assembly, IT support). In the reporting period and the previous year, the following transactions resulting in current receivables and liabilities were entered into with related companies that are not consolidated:

[T137] Trade receivables from and trade payables to related companies

in € million	Trade receivables Dec. 31, 2022	Trade receivables Dec. 31, 2021	Trade payables Dec. 31, 2022	Trade payables Dec. 31, 2021
Associates	438	323	0	0
Joint ventures	127	155	13	0
Subsidiaries accounted for at fair value	9	1	1	3
Total	**574**	**480**	**13**	**3**

[T138] Income/expense from trade receivables from related companies

in € million	Income Dec. 31, 2022	Income Dec. 31, 2021	Expenses Dec. 31, 2022	Expenses Dec. 31, 2021
Associates	2,045	1,654	–1,140	–1,041
Joint ventures	435	403	–396	–160
Subsidiaries accounted for at fair value	3	8	–28	–26
Total	**2,483**	**2,064**	**–1,565**	**–1,226**

Furthermore, there is a guarantee of €152 million for credit lines of EME Aero Sp. z. o. o., which is recognized as a contingent liability (guarantees and other contingent liabilities).

In addition, there are unutilized financing commitments to EME Aero Sp. z o.o., Ceramic Coating Center S.A.S and Airfoil Services Sdn.Bhd. in the form of capital contributions or shareholder loans totaling €142 million.

Major shareholdings

The list of major shareholdings shows the equity investments of MTU Aero Engines AG, Munich, and the equity of each company as of December 31, 2022:

[T139] Major shareholdings

Name and registered office of entity	Consolidation method [2]	Shareholding (in %) Dec. 31, 2022
I. Investments in subsidiaries		
MS Engine Leasing LLC., Rocky Hill, USA [1]	Full	75.22
MTU Aero Engines Finance Netherlands B.V., Amsterdam, Netherlands	Fair value	100.00
MTU Aero Engines North America Inc., Rocky Hill, USA	Full	100.00
MTU Aero Engines Polska sp. z o.o., Jasionka, Poland	Full	100.00
MTU Aero Engines (Shanghai) Ltd., Shanghai, China	Fair value	100.00
MTU Maintenance Berlin-Brandenburg GmbH, Ludwigsfelde, Germany	Full	100.00
MTU Maintenance Canada Ltd., Richmond, Canada	Full	100.00
MTU Maintenance Dallas Inc., Grapevine, USA	Fair value	100.00
MTU Maintenance Hannover GmbH, Langenhagen, Germany	Full	100.00
MTU Maintenance do Brasil LTDA, Cotia, Brazil	Fair value	100.00
MTU Maintenance Lease Services B.V., Amsterdam, Netherlands	Full	100.00
MTU Maintenance Serbia d.o.o. Nova Pazova, Nova Pazova, Serbia	Full	100.00
MTU Maintenance Service Centre Australia Pty. Ltd., Perth, Australia	Fair value	100.00
MTU Maintenance Service Centre Ayutthaya Ltd., Ayutthaya, Thailand	Fair value	100.00
MTU Maintenance Singapore Pte. Ltd., Singapore	Fair value	100.00
MTU Versicherungsvermittlungs- und Wirtschaftsdienst GmbH, Munich, Germany	Fair value	100.00
II. Investments in associates		
IAE International Aero Engines AG, Zurich, Switzerland	At equity	25.25
IAE International Aero Engines LLC., East Hartford, USA	At equity	18.00
PW 1100G_JM Engine Leasing LLC., East Hartford, USA	At equity	18.00
III. Equity investments in joint ventures		
AES Aerospace Embedded Solutions GmbH, Munich, Germany	At equity	50.00
Airfoil Services Sdn. Bhd., Kota Damansara, Malaysia	At equity	50.00
Ceramic Coating Center S.A.S., Paris, France	At equity	50.00
Engine Maintenance Europe Aero sp.z.o.o., Jasionka, Poland	At equity	50.00
EPI Europrop International GmbH, Munich, Germany	Fair value	28.00
EUMET GmbH, Munich, Germany	Fair value	50.00
EUROJET Turbo GmbH, Hallbergmoos, Germany	Fair value	33.00
MTU Maintenance Hong Kong Ltd., Hong Kong, China [1]	Fair value	50.00
MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China	At equity	50.00
MTU Turbomeca Rolls-Royce GmbH, Hallbergmoos, Germany	Fair value	33.33
MTU Turbomeca Rolls-Royce ITP GmbH, Hallbergmoos	Fair value	25.00
Pratt & Whitney Canada Customer Service Centre Europe GmbH, Ludwigsfelde, Germany [1]	At equity	50.00
Turbo Union GmbH, Hallbergmoos, Germany	Fair value	39.98

[1] Indirect shareholding.
[2] - Full = fully consolidated.
- Fair value = measured at fair value.
- At equity = carrying amount of investment increased or decreased in proportion to group's interest in equity.

Related persons

Other than the transactions specified in *"Other related party transactions,"* no Group companies entered into any transactions subject to disclosure requirements with members of the Group's Executive Board or Supervisory Board or with any other individuals in key management positions, or with companies of whose governing or supervisory bodies these individuals are members. The same applies to close members of the families of those individuals.

Members of the Executive Board

As of December 31, 2022, the Executive Board of MTU Aero Engines AG, Munich, had the following members:

[T140] Members of the Executive Board

Reiner Winkler Chief Executive Officer (until December 31, 2022)
Peter Kameritsch Chief Financial Officer and Chief Information Officer
Michael Schreyögg Chief Program Officer
Lars Wagner Chief Operating Officer (Chief Executive Officer since January 1, 2023)

Executive Board compensation

The members of the Executive Board received total compensation amounting to €11 million (previous year: €10 million) for their work as board members in fiscal year 2022. Total compensation breaks down into the following components:

[T141] Compensation of the Executive Board

	2022		2021	
	in € million	in %	in € million1)	in %
Short-term employee benefits				
Non-performance-related components	3		3	
Performance-related components without long-term incentive effect[1]	4		4	
Performance-related components with long-term incentive effect[1]	3		3	
Total	**10**	**92**	**9**	**85**
Post-employment benefits				
Pension expenses	1		2	
Total	**1**	**8**	**2**	**15**
Total compensation	**11**	**100**	**10**	**100**

[1] Components granted for the reporting period (or previous year) that are paid out in the year after they were granted.

Members of the Executive Board did not receive any compensation for board appointments in Group companies.

In the reporting period, as in the previous year, no loans or advances were granted to members of the Executive Board. Similarly, as in the previous year, no contingent liabilities were assumed by the company in favor of members of the Executive Board.

Provisions for pensions and entitlements of former Executive Board members were €10 million as of December 31, 2022 (previous year: €14 million).

Details of the compensation awarded to individual members of the Executive Board, and other related information, are presented in the *Management compensation report in the section headed "The MTU share."*

Compensation of the Supervisory Board members

Detailed information on the compensation system for MTU's Supervisory Board members is provided in the *Management compensation report in the section headed "The MTU share."*

As in the previous year, members of the Supervisory Board did not receive any additional compensation for board appointments over and above that received for their appointment to the Supervisory Board of MTU Aero Engines AG, Munich. The compensation amounted to €2 million (previous year: €1 million).

In fiscal year 2022, MTU employees appointed as employee representatives to the Supervisory Board of MTU Aero Engines AG received salaries under their normal employment contracts (excluding Supervisory Board compensation) totaling €1 million (previous year: €1 million). The total amount represents the sum of their respective gross salaries.

In the reporting period, as in the previous year, no loans or advances were granted to members of the Supervisory Board. Similarly, as in the previous year, no contingent liabilities were assumed by the company in favor of members of the Supervisory Board.

Details of the compensation awarded to individual members of the Supervisory Board, and other related information, are presented in the *Management compensation report in the section headed "The MTU share."*

Other related party transactions

MTU shares and options bought or sold by members of the Executive Board and the Supervisory Board in fiscal year 2022 were bought or sold on an arm's length basis. The transactions were published in the register of companies and on *MTU's website at www.mtu.de > Investor Relations > Corporate Governance > Directors' Dealings.*

Shareholders

Pursuant to Section 160 (1) no. 8 of the German Stock Corporation Act (AktG), disclosure is required of shareholdings of which the company has been notified pursuant to Section 21 (1) or (1a) of the German Securities Trading Act (WpHG). Detailed information can be found under *"The MTU share."*

V. Segment information

39. Segment reporting

MTU reports on two operating segments: the OEM segment (commercial and military engine business) and the MRO segment (commercial maintenance business). Segmentation is based on the internal organizational structure and the corresponding reporting system, which takes into account the different risks and return structures for both segments. A detailed description of the operating segments is provided in the *Consolidated segment report.*

Commercial and military engine business (OEM)

In the commercial and military engine business, the Group develops, manufactures, assembles and delivers commercial and military engines and components. The maintenance, repair and overhaul of military engines is also included in this segment.

Commercial maintenance business (MRO)

In the commercial maintenance business, the Group maintains, repairs and overhauls aircraft engines and industrial gas turbines. In addition to complete engine maintenance, the services provided include engine module and parts repairs as well as related services, such as engine leasing.

Profit/loss of companies accounted for using the equity method

The carrying amount and the share in profit/loss of consolidated Group companies accounted for using the equity method are included in the consolidated financial statements if these companies can be directly allocated to an operating segment.

Segment assets and segment liabilities

Segment assets comprise all assets that can be directly allocated to specific operating activities and whose positive or negative operating results have an impact on earnings before interest and tax (EBIT/adjusted EBIT). Assets and liabilities are allocated to the operating segment in which they are used to generate business. To determine segment assets, the carrying amounts of subsidiaries and receivables between the segments were consolidated. Further details are provided in the *Consolidated segment report.*

The cash and cash equivalents of the German Group companies are managed centrally by the parent company in a cash pooling system. The parent company's operating activities are allocated to the OEM segment, which is why the associated interest income and expense arise mainly in that segment.

Segment capital expenditures

Segment capital expenditures relate to additions to tangible and intangible fixed assets, acquired program assets and acquired development assets.

[T142] Capital expenditure on intangible assets, property, plant and equipment, acquired program assets and acquired development work

in € million	2022	2021
Germany	289	291
Europe (excluding Germany)	177	102
North America	6	10
Total capital expenditure	**472**	**402**

Approximately 61% (previous year: approximately 72%) of capital expenditure on intangible assets, property, plant and equipment, acquired program assets and acquired development work relates to Group companies in Germany.

Consolidation / reconciliation column

The amounts in the “consolidation/reconciliation” column for earnings before interest and tax (EBIT/adjusted EBIT) are used to eliminate the effect of intersegment sales.

Segment information by region

External revenues, capital expenditure on tangible and intangible fixed assets, and non-current assets are divided into the following regions: Germany, Europe (excluding Germany), North America, Asia and other regions. Revenue from business with third parties is allocated according to the country where the customer is domiciled. Further details relating to the breakdown of revenue by region are presented in *Note II. “Notes to the consolidated income statement – 1 Revenue.”*

The regional allocation of capital expenditure and non-current assets is based on the location of the respective asset or where it is mainly used.

[T143] Non-current assets

in € million	2022	2021
Germany	2,888	3,004
Europe (excluding Germany)	713	654
North America	545	385
Total non-current assets	**4,146**	**4,043**

VI. Events after the reporting date

After the end of the fiscal year, major fire damage was recorded at a key supplier for MTU and its partner companies. This could have negative impacts on the new and spare parts business as well as for the aftermarket business, and therefore also on MTU's net assets, financial position and results of operations. The damage from the fire could prove to be a further burden to the supply chains relevant to MTU and therefore also to production and maintenance capacities, particularly for the GTF programs, which have already suffered from the consequences of the COVID-19 pandemic and the geopolitical ramifications of the Russia/Ukraine war. MTU is systematically monitoring the effects to the supply chain and the capacity situation and, working closely with its OEM business partners, implementing measures to offset these effects.

Beyond this, MTU is not aware of any events of material importance that occurred after the reporting date that could have a significant impact on the net assets, financial position and results of operations of the MTU Group as presented in this report.

VII. Determination of the net profit available for distribution on the basis of the annual financial statements

Unlike the consolidated financial statements, which are based on the IFRSs issued by the IASB and endorsed by the EU, the annual financial statements of MTU Aero Engines AG, Munich, are prepared in accordance with the requirements of the German Commercial Code (HGB) and German Stock Corporation Act (AktG).

[T144] Income statement of MTU Aero Engines AG

			Change against previous year	
in € million	2022	2021	in € million	in %
Revenue	**4,194**	**3,695**	**499**	**13.5**
Cost of goods sold	-3,912	-3,549	-363	-10.2
Gross profit	**282**	**145**	**137**	**93.9**
Selling expenses	-98	-94	-4	-4.5
General administrative expenses	-64	-60	-4	-7.4
Net other operating income/expenses	59	103	-44	-42.9
Net financial income/expense	216	169	47	27.6
Earnings from ordinary operating activities	**395**	**265**	**130**	**49.2**
Tax expense	-128	-67	-61	-91.2
Net profit for the year	**267**	**198**	**69**	**35.0**
Allocation to other retained earnings	-96	-86	-10	-11.6
Net profit available for distribution	**171**	**112**	**59**	**53.0**

Proposed profit distribution

Subject to the approval of the Supervisory Board, a proposal will be put to the Annual General Meeting that the entire net profit available for distribution be used to pay a dividend of €3.20 per non-par-value shares eligible for the dividend (previous year: €2.10).

In accordance with Section 58 (4) (2) of the German Stock Corporation Act (AktG) as applicable since January 1, 2017, the claim to payment of the dividend is on the third business day following the resolution passed at the Annual General Meeting – and therefore on May 16, 2023.

Federal Gazette (Bundesanzeiger)

The annual financial statements, consolidated financial statements and combined management report of MTU Aero Engines AG, Munich, are published in the Electronic Federal Gazette (elektronischer Bundesanzeiger). Print copies can be obtained on request from MTU Aero Engines AG, 80995 Munich, Germany.

Declaration of conformity with the German Corporate Governance Code

The declaration of conformity by the Executive Board and Supervisory Board of MTU Aero Engines AG, Munich, pursuant to Section 161 of the German Stock Corporation Act (AktG) is published in the MTU Annual Report 2022 and also permanently available to shareholders on the MTU website at www.mtu.de.

München, den 14. März 2023

signed
Lars Wagner
Chief Executive Officer

signed
Peter Kameritsch
Chief Financial Officer and Chief Information Officer

signed
Dr. Silke Maurer
Chief Operating Officer

signed
Michael Schreyögg
Chief Program Officer

Responsibility statement and independent auditor’s report

Responsibility statement

We hereby affirm that, to the best of our knowledge, the consolidated financial statements of the MTU Group and the separate annual financial statements of MTU Aero Engines AG present a true and fair view of their respective net assets, financial position and results of operations in accordance with the applicable financial reporting standards, and that the combined management report provides a faithful and accurate review of the business performance of the MTU Group and of MTU Aero Engines AG, including business performance and position, and outlines the significant opportunities and risks of the MTU Group's and MTU Aero Engines AG's likely future development.

Munich, March 14, 2023

signed
Lars Wagner
Chief Executive Officer

signed
Peter Kameritsch
Chief Financial Officer and Chief Information Officer

signed
Michael Schreyögg
Chief Program Officer

signed.
Dr. Silke Maurer
Chief Operating Officer

Independent auditor's report

To MTU Aero Engines AG

Report on the audit of the consolidated financial statements and of the combined management report

Opinions

We have audited the consolidated financial statements of MTU Aero Engines AG, Munich, and its subsidiaries (the Group), which comprise the consolidated income statement and consolidated statement of comprehensive income for the fiscal year from 1 January 2022 to 31 December 2022, the consolidated balance sheet as at 31 December 2022, the consolidated statement of changes in equity and the consolidated statement of cash flows for the fiscal year from 1 January 2022 to 31 December 2022, and the notes to the consolidated financial statements, including the recognition and measurement principles presented therein. In addition, we have audited the group management report, which is combined with the management report of MTU Aero Engines AG, Munich, ("combined management report") for the fiscal year from 1 January 2022 to 31 December 2022. In accordance with the German legal requirements, we have not audited the content of the chapters "Internal control and risk management system" and "Compliance management system" included in the section "Main features of the internal control and risk management system" and the non-financial statement and corporate governance statement included in the section "Other disclosures" of the combined management report.

In our opinion, on the basis of the knowledge obtained in the audit,

- the accompanying consolidated financial statements comply, in all material respects, with the International Financial Reporting Standards (IFRSs) as adopted by the EU, and the additional requirements of German commercial law pursuant to Sec. 315e (1) HGB ["Handelsgesetzbuch": German Commercial Code] and, in compliance with these requirements, give a true and fair view of the assets, liabilities and financial position of the Group as at 31 December 2022 and of its financial performance for the fiscal year from 1 January 2022 to 31 December 2022, and
- the accompanying combined management report as a whole provides an appropriate view of the Group's position. In all material respects, this combined management report is consistent with the consolidated financial statements, complies with German legal requirements and appropriately presents the opportunities and risks of future development. Our opinion on the management report does not cover the chapters "Internal control and risk management system" and "Compliance management system" included in the section "Main features of the internal control and risk management system" and the non-financial statement and corporate governance statement included in the section "Other disclosures" of the combined management report.

Pursuant to Sec. 322 (3) Sentence 1 HGB, we declare that our audit has not led to any reservations relating to the legal compliance of the consolidated financial statements and of the combined management report.

Basis for the opinions

We conducted our audit of the consolidated financial statements and of the combined management report in accordance with Sec. 317 HGB and the EU Audit Regulation (No 537/2014, referred to subsequently as "EU Audit Regulation") and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer [Institute of Public Auditors in Germany] (IDW). Our responsibilities under those requirements and principles are further described in the "Auditor's responsibilities for the audit of the consolidated financial statements and of the combined management report" section of our auditor's report. We are independent of the group entities in accordance with the requirements of European law and German commercial and professional law, and we have fulfilled our other German professional responsibilities in accordance with these requirements.

In addition, in accordance with Art. 10 (2) f) of the EU Audit Regulation, we declare that we have not provided non-audit services prohibited under Art. 5 (1) of the EU Audit Regulation. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinions on the consolidated financial statements and on the combined management report.

Key audit matters in the audit of the consolidated financial statements

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements for the fiscal year from 1 January 2022 to 31 December 2022. These matters were addressed in the context of our audit of the consolidated financial statements as a whole, and in forming our opinion thereon; we do not provide a separate opinion on these matters.

Below, we describe what we consider to be the key audit matters:

1. Recognition of revenue from risk- and revenue-sharing partnerships

Reasons why the matter was determined to be a key audit matter

The MTU Group primarily generates its revenue in the commercial and military engine business (OEM segment (Original Equipment Manufacturing)) from risk- and revenue-sharing partnerships with other engine manufacturers. In the civilian OEM segment, the respective syndicate leaders (OEM) are identified as customers; in the military engine business these are the syndicate's end customers. The significant performance obligations are manufacturing and delivering engine parts along with developing and providing technology.

Revenue from delivering engine modules and parts is recognized when MTU fulfills the performance obligation identified in the contract by delivering the goods. Consequently, revenue is recognized when the customer obtains control over the asset. For engine programs in which the syndicate leader is provided with the right to use the engine modules and parts for marketing by having them delivered to their warehouse, this is the time at which delivery is made to the syndicate leader. The basis for the amount of revenue is the expected contractually agreed purchase price for the assets. Reports on risk- and revenue-sharing partnerships, the volumes sold and the final purchase prices are only available at a later point in time, generally after the engine modules and parts have been delivered by the OEM to the end customers.

Furthermore, risk- and revenue-sharing partnerships mean that MTU is obliged to provide other partners with licenses to its technology. MTU receives variable remuneration for these licenses. The variable remuneration is recognized based on the reports of the risk- and revenue-sharing partnerships as at this time there is reasonable assurance regarding the amount of the remuneration. If there is a delay in submitting these reports, revenue from the provision of the license is deferred based on estimate taking into account the contractual arrangements as of the reporting date.

Revenue, which has not been recognized based on reports on risk- and revenue-sharing partnerships, is recognized in the balance sheet under trade receivables or contract assets. Billing risks are recorded as refund liabilities.

There is a risk of error when recognizing revenue and a risk of fraud on account of incentives to achieve certain performance targets and forecasts if the recognition is not based on a partner report. The materiality of revenue for the consolidated financial statements, the discretionary scope involved in the required estimates and the fact that revenue and adjusted EBIT are financial performance indicators for the Group in terms of corporate management and forecasts meant that revenue at the time of delivery to the warehouse of the syndicate leader and the revenue from the provision of the license as of the reporting date constituted a key audit matter.

Auditor's response

We used a controls-based audit approach for the assessment of revenue recognition from risk- and revenue-sharing partnerships. To this end, we assessed the structure of the underlying corporate processes and tested selected controls of the internal control system related to accounting. In addition, we also performed the following substantive audit procedures:

For intraperiod transactions, we performed data analyses on any existing anomalies. In this context, our procedures included correlation analyses and time series analyses. We verified the development of contract assets resulting from the recognition of revenue upon delivery to the warehouse of the syndicate leader on a sample basis by inspecting the delivery notes (upon delivery) or the reports on risk- and revenue-sharing partnerships (upon removal).

Furthermore, we reconciled the contractually agreed purchase prices with the price lists of the consortium on a sample basis. In addition, we assessed the underlying valuation methods and key valuation parameters with regard to the estimation of settlement risks and verified the arithmetical accuracy of the calculation.

We reconciled the estimated values with the reports received from risk- and revenue-sharing partnerships in January 2023 on a sample basis in order to assess the revenue estimate from the variable license fees for December 2022.

In addition, we also reconciled recorded revenue against payments received and analyzed credits granted in January in respect of their allocation to the correct period. We reconciled non-standard transactions, journal entries and closing entries to the underlying documents on a sample basis.

Our audit procedures did not lead to any reservations regarding the recognition of revenue from risk- and revenue-sharing partnerships.

Reference to related disclosures
The disclosures on the principles of revenue recognition are contained in the notes to the consolidated financial statements in section I. Accounting principles and policies "Revenue", "Contract assets", "Contract liabilities", "Refund liabilities" and " Discretionary scope, measurement uncertainties and sensitivity". In addition, the significance of revenue in the context of corporate management and with regard to business development and forecast are presented in the sections "MTU AG/management system of the Group" and "Macroeconomic conditions/Financial performance indicators" of the combined management report.

2. Measurement of liabilities from warranty obligations and risks from pending transactions

Reasons why the matter was determined to be a key audit matter
In the consolidated financial statements of MTU Aero Engines AG, liabilities from warranty obligations and risks from pending transactions are reported as "Refund liabilities" and "Other provisions" under non-current and current liabilities in the balance sheet. They relate to statutory and agreement-specific obligations and comprise estimates made on both a case-by-case and general basis. During our audit, we determined the valuation of liabilities from warranty obligations and risks from pending transactions, which relate to specific individual matters and are subject to a high estimation uncertainty, to be a key audit matter. This is as the valuation of these items, the amount of which is significant, depends to a large extent on the estimates and assumptions of the executive directors, in particular with regard to the technical risks and the amount of the expected costs.

Auditor's response
To assess the measurement of liabilities from warranty obligations as well as risks from pending transactions, we examined the design of the underlying business processes, in particular the process of preparing the financial statements and tested selected controls of the internal accounting control system. We surveyed representatives of MTU Aero Engines AG regarding the identified matters and reviewed contracts, correspondence and other documentation. In particular, we assessed the underlying measurement methods and key valuation parameters and checked the calculations for arithmetical accuracy. Furthermore, we obtained and analyzed external confirmation from lawyers and representatives of the legal department, as applicable.

Our audit procedures did not lead to any reservations relating to the measurement of liabilities from warranty obligations as well as risks from pending transactions.

Reference to related disclosures
The disclosures on refund liabilities and other provisions are contained in section I. Accounting principles and policies under "Other provisions", "Refund liabilities" and "Discretionary scope, measurement uncertainties and sensitivity" and in section III. Notes to the consolidated balance sheet under "27. Other provisions" and "31. Refund liabilities" of the notes to the consolidated financial statements.

3. Recoverability of payments to customers based on the program term and capitalized development costs from risk- and revenue-sharing partnerships

Reasons why the matter was determined to be a key audit matter
The MTU Group participates in risk- and revenue-sharing partnerships with other engine manufacturers. Payments are made and proportionate costs are assumed in order to enter into these partnerships in the civilian OEM segment. These payments to customers based on the program term are recognized as "Acquired program values, development and other assets" under non-current assets in the consolidated financial statements. The offsetting of the item as a sales deduction is generally revenue-based over the relevant program term. In addition, internally financed development services are rendered, which are capitalized as development costs and are amortized over their useful lives on a straight-line basis.

The Executive Board of MTU Aero Engines AG analyzes whether the assets could be impaired at each reporting date. Potential developments in climate policy were also taken into account in the analysis in fiscal year 2022 in addition to the effects of the sanctions against Russia due to the war in Ukraine. The basis for this is the planning of the individual engine programs over the remaining program term. If the results of the analysis show that there are indications of potential impairment, the discounted cash flows of an asset or an overarching cash-generating unit are compared to the corresponding carrying amount. The Company determines the discount rate (WACC) using external valuation experts.

The assessment of the recoverability of assets is based to a large extent on the estimates of the Company's executive directors, especially for the assumptions on program planning. The resulting discretionary scope gives rise to a generally higher risk for accounting misstatements. Against this backdrop and the significance of the assets, the assessment of the recoverability of the payments to customers based on the program term and the capitalized developments costs from risk- and revenue-sharing partnerships was considered to be a key audit matter.

Auditor's response

We examined the planning process of MTU Aero Engines AG in order to assess the recoverability of payments to customers based on the program term and capitalized development costs. We also obtained evidence to what extent external sources were used to develop significant assumptions as part of the planning process. Based on this, we compared the program planning with the prior-year planning using variance analyses for programs selected on the basis of risk factors and assessed the planning assumptions based on interviews with the responsible program merchants. In doing so, we assessed the management's opinion on the effects of potential climate policy developments on MTU's product portfolio and the economic development of individual engine programs, and compared these with our expectations. We assessed the competence, capabilities and objectivity of the expert engaged by the Company to derive the WACC, gained an understanding of the expert's work and assessed the suitability of that work as audit evidence for the relevant assertion. Furthermore, we assessed the derivation of the WACC with the assistance of internal valuation specialists, in particular by comparing the peer group with comparable companies from an external database, reconciling market data and verifying the arithmetical accuracy of the derivation. We verified the derivation of the carrying amount of net assets. We assessed the valuation model used to assess recoverability in terms of its methodology and calculation.

Our audit procedures did not lead to any reservations regarding the recoverability of payments to customers related to program terms and capitalized development costs from risk- and revenue-sharing partnerships.

Reference to related disclosures

The disclosures on the program assets and capitalized development costs are contained in section I. Accounting principles and policies under "Research and development costs", "Intangible assets", "Acquired program assets and acquired development work", "Impairment of intangible assets, property, plant and equipment as well as acquired program assets and acquired development work" and "Discretionary scope, measurement uncertainties and sensitivity" of the notes to the consolidated financial statements. In addition, there are explanations in the notes to the consolidated financial statements in sections II. Notes to the consolidated income statement under "3. Research and development costs" and III. Notes to the consolidated balance sheet under "13. Development of intangible assets and property, plant and equipment", "14. Intangible assets" and "17. Acquired program assets, development work and other assets". Further information on the capitalized research and development costs can be found in the section "The MTU AG/Research and development" of the combined management report.

Other information

The Supervisory Board is responsible for the Report of the Supervisory Board in the "To our shareholders" chapter of the annual report 2022. The executive directors and the Supervisory Board are responsible for the declaration pursuant to Sec. 161 AktG ["Aktiengesetz": German Stock Corporation Act] on the German Corporate Governance Code, which is part of the corporate governance statement. In all other respects, the executive directors are responsible for the other information. The other information, of which we received a version prior to issuing this auditor's report, includes:

- The chapters "Internal control and risk management system" and "Compliance management system" contained in the section "Main features of the internal control and risk management system" in the combined management report;
- The non-financial statement and corporate governance statement on the section "Other disclosures" of the combined management report;
- The sections "Facts and indicators with prior-year comparison", "To our shareholders", "Responsibility statement by the management and independent auditor's report" and "Additional information" in the 2022 annual report.

Our opinions on the consolidated financial statements and combined management report do not cover the other information, and we therefore do not provide an opinion or any other form of audit conclusion on these matters.

In connection with our audit, our responsibility is to read the other information and to assess whether the other information

- is materially inconsistent with the consolidated financial statements, with the combined management report or our knowledge obtained in the audit, or
- otherwise appears to be materially misstated.

If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Responsibilities of the executive directors and the Supervisory Board for the consolidated financial statements and the combined management report

The executive directors are responsible for the preparation of the consolidated financial statements that comply, in all material respects, with IFRSs as adopted by the EU and the additional requirements of German commercial law pursuant to Sec. 315e (1) HGB, and that the consolidated financial statements, in compliance with these requirements, give a true and fair view of the assets, liabilities, financial position and financial performance of the Group. In addition, the executive directors are responsible for such internal control as they have determined necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud (i.e., fraudulent financial reporting and misappropriation of assets) or error.

In preparing the consolidated financial statements, the executive directors are responsible for assessing the Group's ability to continue as a going concern. They also have the responsibility for disclosing, as applicable, matters related to going concern. In addition, they are responsible for financial reporting based on the going concern basis of accounting unless there is an intention to liquidate the Group or to cease operations, or there is no realistic alternative but to do so.

Furthermore, the executive directors are responsible for the preparation of the combined management report that, as a whole, provides an appropriate view of the Group's position and is, in all material respects, consistent with the consolidated financial statements, complies with German legal requirements and appropriately presents the opportunities and risks of future development. In addition, the executive directors are responsible for such arrangements and measures (systems) as they have considered necessary to enable the preparation of a combined management report that is in accordance with the applicable German legal requirements, and to be able to provide sufficient appropriate evidence for the assertions in the combined management report.

The Supervisory Board is responsible for overseeing the Group's financial reporting process for the preparation of the consolidated financial statements and of the combined management report.

Auditor's responsibilities for the audit of the consolidated financial statements and of the mbined management report

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and whether the combined management report as a whole provides an appropriate view of the Group's position and, in all material respects, is consistent with the consolidated financial statements and the knowledge obtained in the audit, complies with the German legal requirements and appropriately presents the opportunities and risks of future development, as well as to issue an auditor's report that includes our opinions on the consolidated financial statements and on the combined management report.

Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Sec. 317 HGB and the EU Audit Regulation and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer (IDW) will always detect a material misstatement. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements and this combined management report.

We exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements and of the combined management report, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinions. The risk of not detecting a material misstatement resulting from fraud is higher than the risk of not detecting a material misstatement resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit of the consolidated financial statements and of arrangements and measures (systems) relevant to the audit of the combined management report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of these systems.
- Evaluate the appropriateness of accounting policies used by the executive directors and the reasonableness of estimates made by the executive directors and related disclosures.
- Conclude on the appropriateness of the executive directors' use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in the auditor's report to the related disclosures in the consolidated financial statements and in the combined management report or, if such disclosures are inadequate, to modify our respective opinions. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to be able to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements present the underlying transactions and events in a manner that the consolidated financial statements give a true and fair view of the assets, liabilities, financial position and financial performance of the Group in compliance with IFRSs as adopted by the EU and the additional requirements of German commercial law pursuant to Sec. 315e (1) HGB.
- Obtain sufficient appropriate audit evidence regarding the financial information of the businesses or business activities within the Group to express opinions on the consolidated financial statements and on the combined management report. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our audit opinions.
- Evaluate the consistency of the combined management report with the consolidated financial statements, its conformity with [German] law and the view of the Group's position it provides.
- Perform audit procedures for the forward-looking disclosures made by the executive directors in the combined management report. On the basis of sufficient appropriate audit evidence we evaluate, in particular, the significant assumptions used by the executive directors as a basis for the prospective information, and evaluate the proper derivation of the prospective information from these assumptions. We do not express a separate opinion on the prospective information and on the assumptions used as a basis. There is a substantial unavoidable risk that future events will differ materially from the prospective information.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide those charged with governance with a statement that we have complied with the relevant independence requirements, and communicate with them all relationships and other matters that may reasonably be thought to bear on our independence and where applicable, related safeguards.

From the matters communicated with those charged with governance, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor's report unless law or regulation precludes public disclosure about the matter.

Other legal and regulatory requirements

Report on the assurance on the electronic rendering of the consolidated financial statements and the combined management report prepared for publication purposes in accordance with Sec. 317 (3a) HGB

Opinion

We have performed assurance work in accordance with Sec. 317 (3a) HGB to obtain reasonable assurance about whether the rendering of the consolidated financial statements and the combined management report (hereinafter the "ESEF documents") contained in MTU_KA_KLB_ESEF_2022-12-31.zip and prepared for publication purposes complies in all material respects with the requirements of Sec. 328 (1) HGB for the electronic reporting format ("ESEF format"). In accordance with German legal requirements, this assurance extends only to the conversion of the information contained in the consolidated financial statements and the combined management report into the ESEF format and therefore relates neither to the information contained within these renderings nor to any other information contained in the file identified above.

In our opinion, the rendering of the consolidated financial statements and the combined management report contained in the file identified above and prepared for publication purposes complies in all material respects with the requirements of Sec. 328 (1) HGB for the electronic reporting format. Beyond this assurance opinion and our audit opinions on the accompanying consolidated financial statements and the accompanying combined management report for the fiscal year from 1 January 2022 to 31 December 2022 contained in the "Report on the audit of the consolidated financial statements and of the combined management report" above, we do not express any assurance opinion on the information contained within these renderings or on the other information contained in the file identified above.

Basis for the opinion

We conducted our assurance work on the rendering of the consolidated financial statements and the combined management report contained in the file identified above in accordance with Sec. 317 (3a) HGB and the IDW Assurance Standard: Assurance on the Electronic Rendering of Financial Statements and Management Reports Prepared for Publication Purposes in Accordance with Sec. 317 (3a) HGB (IDW AsS 410) (06.2022). Our responsibility in accordance therewith is further described in the "Auditor's responsibilities for the assurance work on the ESEF documents" section. Our audit firm applies the IDW Standard on Quality Management 1: Requirements for Quality Management in the Audit Firm (IDW QS 1).

Responsibilities of the executive directors and the Supervisory Board for the ESEF documents

The executive directors of the Company are responsible for the preparation of the ESEF documents including the electronic rendering of the consolidated financial statements and the combined management report in accordance with Sec. 328 (1) Sentence 4 No. 1 HGB and for the tagging of the consolidated financial statements in accordance with Sec. 328 (1) Sentence 4 No. 2 HGB.

In addition, the executive directors of the Company are responsible for such internal control as they have considered necessary to enable the preparation of ESEF documents that are free from material non-compliance with the requirements of Sec. 328 (1) HGB for the electronic reporting format, whether due to fraud or error.

The Supervisory Board is responsible for overseeing the process for preparing the ESEF documents as part of the financial reporting process.

Auditor's responsibilities for the assurance work on the ESEF documents

Our objective is to obtain reasonable assurance about whether the ESEF documents are free from material intentional or unintentional non-compliance with the requirements of Sec. 328 (1) HGB. We exercise professional judgment and maintain professional skepticism throughout the assurance work. We also:

- Identify and assess the risks of material intentional or unintentional non-compliance with the requirements of Sec. 328 (1) HGB, design and perform assurance procedures responsive to those risks, and obtain assurance evidence that is sufficient and appropriate to provide a basis for our assurance opinion.
- Obtain an understanding of internal control relevant to the assurance on the ESEF documents in order to design assurance procedures that are appropriate in the circumstances, but not for the purpose of expressing an assurance opinion on the effectiveness of these controls.
- Evaluate the technical validity of the ESEF documents, i.e., whether the file containing the ESEF documents meets the requirements of Commission Delegated Regulation (EU) 2019/815, in the version in force at the date of the financial statements, on the technical specification for this file.
- Evaluate whether the ESEF documents enable an XHTML rendering with content equivalent to the audited consolidated financial statements and to the audited combined management report.
- Evaluate whether the tagging of the ESEF documents with Inline XBRL technology (iXBRL) in accordance with the requirements of Arts. 4 and 6 of Commission Delegated Regulation (EU) 2019/815, in the version in force at the date of the financial statements, enables an appropriate and complete machine-readable XBRL copy of the XHTML rendering.

Further information pursuant to Art. 10 of the EU Audit Regulation

We were elected as group auditor by the Annual General Meeting on 5 May 2022. We were engaged by the Supervisory Board on 9 May/27 June 2022. We have been the group auditor of MTU Aero Engines AG without interruption since fiscal year 2014.

We declare that the opinions expressed in this auditor's report are consistent with the additional report to the audit committee pursuant to Art. 11 of the EU Audit Regulation (long-form audit report).

In addition to the financial statement audit, we have provided to the Company or entities controlled by it the following services that are not disclosed in the consolidated financial statements or in the combined management report:

In addition to the statutory audit of the annual financial statements and consolidated financial statements of MTU Aero Engines AG, we also performed audits of the financial statements of subsidiaries and carried out reviews, which were integrated into the audit, of interim financial statements and compliance certificates for loan agreements.

Audit-related services largely included assurance services in respect of the non-financial statement and the remuneration report in accordance with the AktG.

Other matter – use of the auditor's report

Our auditor's report must always be read together with the audited consolidated financial statements and the audited combined management report as well as the assured ESEF documents. The consolidated financial statements and the combined management report converted to the ESEF format – including the versions to be published in the Unternehmensregister [German Company Register] – are merely electronic renderings of the audited consolidated financial statements and the audited combined management report and do not take their place. In particular, the ESEF report and our assurance opinion contained therein are to be used solely together with the assured ESEF documents made available in electronic form.

German Public Auditor responsible for the engagement

The German Public Auditor responsible for the engagement is Christian Baur.

Munich, 21. March 2023

Ernst & Young GmbH
Wirtschaftsprüfungsgesellschaft

Baur	Stummer-Jovanovic
Wirtschaftsprüfer	Wirtschaftsprüfer
[German Public Auditor]	[German Public Auditor]

The assurance engagement performed by Ernst & Young (EY) relates exclusively to the German version of the non-financial statement 2022 of MTU Aero Engines AG.

The following text is a translation of the original German independent assurance report.

Independent auditor's report on limited and reasonable assurance engagement

To MTU Aero Engines AG, Munich

We have performed an assurance engagement on the non-financial statement of MTU Aero Engines AG, Munich, which is combined with the non-financial statement of the group, consisting of the chapter "Non-financial statement" in the group management report as well as the section "The MTU Group" in the group management report being incorporated by reference, for the reporting period from January 1, 2022 to December 31, 2022.

Our engagement refers to

/ the disclosures in the non-financial statement marked with the Symbol „[√]" on the KPIs "Maximum residual CO_2 emissions" and "CO_2 savings through sustainable measures " as well as the "Total Index value Puls-Check" (in the following "selected ESG KPIs") with reasonable assurance and

/ the other disclosures in the non-financial statement (in the following "other non-financial disclosures") with limited assurance.

Not subject to our assurance engagement are other references to disclosures made outside the non-financial statement.

Responsibilities of the executive Directors

The executive directors of the Company are responsible for the preparation of the non-financial statement in accordance with See. 315c in conjunction with Sees. 289c to 289e HGB ["Handelsgesetzbuch": German Commercial Code] and Art. 8 of Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment and amending Regulation (EU) 2019/2088 (hereinafter the "EU Taxonomy Regulation") and the Delegated Acts adopted thereunder as well as in accordance with their own interpretation of the wording and terms contained in the EU Taxonomy Regulation and the Delegated Acts adopted thereunder as set out in the section "Disclosures on the EU taxonomy" of the non-financial statement.

These responsibilities of the Company's executive directors include the selection and application of appropriate non-financial reporting methods and making assumptions and estimates about individual non-financial disclosures that are reasonable in the circumstances. Furthermore, the executive directors are responsible for such internal control as the executive directors consider necessary to enable the preparation of a non-financial statement that is free from material misstatement, whether due to fraud (manipulation of the non-financial statement) or error.

The EU Taxonomy Regulation and the Delegated Acts adopted thereunder contain wording and terms that are still subject to considerable interpretation uncertainties and for which clarifications have not yet been published in every case. Therefore, the executive directors have disclosed their interpretation of the EU Taxonomy Regulation and the Delegated Acts adopted thereunder in the section "Disclosures on the EU taxonomy" of the non-financial statement. They are responsible for the defensibility of this interpretation. Due to the immanent risk that undefined legal terms may be interpreted differently, the legal conformity of the interpretation is subject to uncertainties.

Independence and quality assurance of the auditor's firm

We have complied with the German Professional requirements on independence as well as other Professional conduct requirements.

Our audit firm applies the national legal requirements and Professional pronouncements - in particular the BS WP/vBP ["Berufssatzung für Wirtschaftsprüfer/vereidigte Buchprüfer": Professional Charter for German Public Accountants/German Sworn Auditors] in the exercise of their Profession and the IDW Standard on Quality Management issued by the Institute of Public Auditors in Germany (IDW): Requirements for Quality Management in the Audit Firm (IDW QS 1) and accordingly maintains a comprehensive quality management System that includes documented policies and procedures with regard to compliance with Professional ethical requirements, Professional Standards as well as relevant statutory and other legal requirements.

Responsibilities of the auditor

Based on our assurance engagement, our responsibility is to express a reasonable assurance opinion on selected ESG KPIs as well as a limited assurance opinion on the other non-financial disclosures in the non-financial statement.

We conducted our assurance engagement in accordance with International Standard on Assurance Engagements (ISAE) 3000 (Revised): "Assurance Engagements other than Audits or Reviews of Historical Financial Information" issued by the IAASB.

Responsibilities of the auditor for the assurance of selected ESG KPIs with reasonable assurance
ISAE 3000 (Revised) requires that we plan and perform the assurance engagement to obtain reasonable assurance about whether the Company's non-financial statement is prepared, in all material respects, in accordance with See. 315c in conjunction with Sees. 289c to 289e HGB.

The assurance engagement on the non-financial statement includes performing procedures and obtaining evidence for the quantitative and qualitative disclosures in the non-financial statement that is sufficient and appropriate to provide a basis for our opinion.

We exercise Professional judgment and maintain Professional scepticism throughout the assurance engagement. Our procedures also include:

- Identifying and assessing the risks of material misstatement of the selected ESG KPIs, whether due to fraud or error, designing and performing procedures responsive to those risks, and obtaining evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtaining an understanding of internal control relevant to the assurance engagement on the selected ESG KPIs in order to design procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of these systems.
- Evaluating the appropriateness of methods used by the executive directors and the reasonableness of estimates made by the executive directors and related disclosures.
- Evaluating the presentation of disclosures in the non-financial statement.

We believe that the evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Responsibilities of the auditor for the assurance of other non-financial disclosures with limited assurance

ISAE 3000 (Revised) requires that we plan and perform the assurance engagement to obtain limited assurance about whether any matters have come to our attention that cause us to believe that the Company's non-financial statement is not prepared, in all material respects, in accordance with See. 315c in conjunction with Sees. 289c to 289e HGB and the EU Taxonomy Regulation and the Delegated Acts adopted thereunder as well as the Interpretation by the executive directors disclosed in the section "Disclosures on the EU taxonomy" of the non-financial statement. Not subject to our assurance engagement are other references to disclosures made outside the non-financial statement.

In a limited assurance engagement, the procedures performed are less extensive than in a reasonable assurance engagement, and accordingly, a substantially lower level of assurance is obtained. The selection of the assurance procedures is subject to the Professional judgment of the auditor.

In the course of our assurance engagement we have, among other things, performed the following assurance procedures and other activities:

- Inquiries of the employees regarding the selection of topics for the non-financial statement, the risk assessment, and the policies of MTU for the topics identified as material,
- Inquiries of employees responsible for data capture and consolidation, the data capture and Compilation methods as well as internal Controls to the extent relevant for the assurance of the other disclosures in the non-financial statement,
- Identification of likely risks of material misstatement,
- Inspection of relevant documentation of the Systems and processes for compiling, aggregating and validating data in the relevant areas, e.g. compliance and human resources in the reporting period and testing such documentation on a sample basis,
- Analytical procedures on other disclosures in the non-financial statement at the level of the Company and the Group,
- Inquiries and inspection of documents relating to the collection and reporting of selected qualitative information and data,
- Evaluation of the process to identify the taxonomy-eligible or taxonomy-compliant economic activities and the corresponding disclosures in the non-financial statement,
- Evaluation of the presentation of the non-financial statement.

In determining the disclosures in accordance with Art. 8 of the EU Taxonomy Regulation, the executive directors are required to interpret undefined legal terms. Due to the immanent risk that undefined legal terms may be interpreted differently, the legal conformity of their interpretation and, accordingly, our assurance engagement thereon are subject to uncertainties.

Assurance conclusion

In our opinion, on the basis of the knowledge obtained in the assurance engagement, the selected ESG KPIs in the non-financial statement of the MTU Aero Engines AG for the period from 1 January to 31 December 2021 have been prepared, in all material respects, in accordance with See. 315c in conjunction with Sees. 289c to 289e HGB.

Based on the assurance procedures performed and the evidence obtained, nothing has come to our attention that causes us to believe that the other non-financial disclosures in the non-financial statement of the Company for the period from 1 January to 31 December 2022 have not been prepared, in all material respects, in accordance with See. 315c in conjunction with Sees. 289c to 289e HGB and the EU Taxonomy Regulation and the Delegated Acts adopted thereunder as well as the Interpretation by the executive directors as disclosed in the section “Disclosures on the EU taxonomy” of the non-financial statement.

Not subject to our assurance engagement are other references to disclosures made outside the non-financial statement.

Restriction of use

We draw attention to the fact that the assurance engagement was conducted for the Company’s purposes and that the report is intended solely to inform the Company about the result of the assurance engagement. As a result, it may not be suitable for another purpose than the aforementioned. Accordingly, the report is not intended to be used by third parties for making (financial) decisions based on it. Our responsibility is to the Company alone. We do not accept any responsibility to third parties. Our assurance opinion is not modified in this respect.

General Engagement Terms and Liability

The “General Engagement Terms for Wirtschaftsprüfer and Wirtschaftsprüfungsgesellschaften [German Public Auditors and Public Audit Firms]” dated 1 January 2017 are applicable to this engagement and also govern our relations with third parties in the context of this engagement (www.de.ey.com/general-engagement-terms). In addition, please refer to the liability provisions contained there in no. 9 and to the exclusion of liability towards third parties. We accept no responsibility, liability or other obligations towards third parties unless we have concluded a written agreement to the contrary with the respective third party or liability cannot effectively be precluded.

We make express reference to the fact that we will not update the report to reflect events or circumstances arising after it was issued, unless required to do so by law. It is the sole responsibility of anyone taking note of the summarized result of our work contained in this report to decide whether and in what way this information is useful or suitable for their purposes and to Supplement, verify or update it by means of their own review procedures.

Munich, 21. March 2023

Ernst & Young GmbH
Wirtschaftsprüfungsgesellschaft

sgd.	sgd.
Nicole Richter	ppa. Marie C. Dollhofer
Wirtschaftsprüferin	

Additional information

Glossary of engine terms

Fan
The first rotor of the low-pressure compressor is called the fan. It accelerates the bypass stream flowing aftward and provides the engine's main thrust. It is driven by the low-pressure turbine via the low-pressure shaft.

Geared Turbofan™
What sets the Geared Turbofan™ propulsion system apart is that it features a reduction gearbox between the fan and low-pressure shaft on which the low-pressure compressor and low-pressure turbine that drives the fan are seated. The gearbox allows the fan with its large diameter to rotate more slowly and, at the same time, the low-pressure compressor and turbine to rotate much faster. This enables lower fan pressure ratios and therefore higher bypass ratios to be achieved so the individual components can operate at their respective optimum speeds. As a result, the efficiency of the Geared Turbofan™ is greatly boosted. Therefore, fuel consumption as well as carbon dioxide and noise emissions are significantly reduced. The propulsion system is moreover lighter than a conventional engine owing to the reduced compressor and turbine stage count. In addition, the maintenance costs are lower.

Industrial gas turbines
The operating principle of an industrial gas turbine is essentially the same as that of an aero engine. However, instead of the customary low-pressure turbine used in aircraft, industrial gas turbines have a power turbine. This turbine delivers the power, either directly or via a gear unit, to an additional attached power unit such as a pump or generator. Nearly all industrial gas turbines of the lower and intermediate power classes are aero-engine derivatives.

MRO business
MRO stands for maintenance, repair and overhaul. At MTU, the term "MRO business" is also used more specifically to designate one of the company's operating segments, where it refers to maintenance services for commercial engines, or commercial MRO.

OEM business
OEM stands for original equipment manufacturer. At MTU, the term "OEM business" is used to designate one of the company's operating segments, where it refers to the development, manufacture and assembly of (new) commercial and military engines. Spare parts for (in-service) commercial and military engines and maintenance services for military engines are also included in this operating segment.

Risk- and revenue-sharing partnership
In a risk- and revenue-sharing partnership, each partner contributes a certain share of the resources needed for a specific engine program (work capacity and funding), thus bearing part of the risk. In return, each partner is entitled to a corresponding percentage of the overall sales revenue from that program.

Thrust class
Jet engines are generally grouped into three thrust classes: engines with a thrust of between 2,500 and around 20,000 pounds (roughly 10 to 90 kN), mainly used to power business and regional jets; engines with a thrust of between 20,000 and approximately 50,000 pounds (roughly 90 to 225 kN), used to power medium-haul aircraft; and engines with a thrust ranging from 50,000 to over 100,000 pounds (roughly 225 to 450 kN), used to power long-haul aircraft.

Subsystem
A complete aircraft engine is made up of a number of subsystems. These include the high-pressure and low-pressure compressors, the combustor, the high-pressure and low-pressure turbines and the engine control system.

Turbine
In a turbine, the energy contained in the gases emerging from the combustor is converted into mechanical energy. Like the compressor, the turbine is subdivided into a high-pressure and a low-pressure section, each of which is directly connected to the corresponding compressor via the respective shaft. The turbine has to withstand much higher stresses than the compressor, as it has to deal not only with the high gas temperatures but also with extreme centrifugal forces of several tons acting on the outer rim of its disks.

Turbine center frame
The turbine center frame connects the high-pressure to the low-pressure turbine. It has to be able to withstand high mechanical and thermal loads. The center frame includes struts, clad with an aerodynamic fairing, to support the shaft bearings and the air and oil supply lines.

Turbofan engine
The turbofan is an advancement of the turbojet principle, the main difference being its enlarged first compressor stage, the fan. While in turbojet engines all of the ingested air flows consecutively through the compressor, the combustor and the turbine, turbofans separate the air stream behind the fan. Part of the air flows through further compressor stages to the combustor and then the turbine, flowing through the core engine. The rest, however – which constitutes a much larger fraction – is channeled around the inner components, providing the engine's main thrust. The ratio between these two airflows is known as the bypass ratio. The greater the bypass ratio, the more economical, environmentally compatible and silent the engine.

Turboprop engine
The most noticeable external feature of a turboprop is its propeller. Inside, however, the engine differs only slightly from the turbojet and the turbofan. The turbine is larger and drives not only the compressor but also the propeller, the latter via a gear unit. Consequently, more energy has to be drawn from the exhaust gas stream in the turbine of a turboprop than in other engine types. Over 90% of the energy is required for the compressor and the propeller. Turboprop airplanes can achieve flight speeds of up to 800 km/h. They are thus slower than turbojet or turbofan airplanes, but they do have the advantage of consuming far less fuel. This predestines them for use in roles where speed is less important, such as on short-haul routes or for air freight.

Turboshaft engine
Turboshaft engines are used in helicopters and are similar to turboprops.

Compressor
The task of the compressor is to ingest air and compress it before it is fed into the combustor. Compressors consist of bladed disks (rotors) that rotate at very high speed between stationary guide vanes (stators). In order to achieve a compression ratio of over 40:1, which is standard in all modern two-shaft engines, it is necessary to use multi-stage low-pressure and high-pressure compressors rotating at different speeds on dual concentric shafts. These are driven by the corresponding turbines.

Overview of engines

COMMERCIAL ENGINES

	Widebody jets	Narrowbody / regional jets	Business jets
Development/ Manufacturing	CF6	JT8D-200	PW300
	GE9x	GTF™ Triebwerksfamilie	PW500
	GEnx	PW2000	PW800
	GP7000	V2500	
	PW4000		

	Widebody jets	Narrowbody / regional jets	Business jets
Maintenance	CF6-80C[1]	CF34-8/-10E	PW300
	GE90-110B/-115B	CFM56-2/-5B/-7[1]	PW500
	GE9x – TCF MRO (geplant)	GTF™ Triebwerksfamilie (PW1100G-JM, PW1500G/1900G)	PW800 – NDT MRO (Engine MRO geplant)
	GEnx – TCF MRO	LEAP-1A/-1B	
	GP7000 – NDT MRO	PW2000	
		V2500-A5[1]	

	Turboprop	Helicopters	
	PT6A	PW200	

MILITARY ENGINES

	Fighter jets	Helicopters	Transporters
Development/ Manufacturing	EJ200	MTR390	TP400-D6
	F110	T408	
	F414	T64	
	Larzac		
	RB199		

	Fighter jets	Helicopters	Transporters
Maintenance[2]		T64	TP400-D6

	Fighter jets	Helicopters	Transporters
Maintenance within the scope of the cooperation with Germany's armed forces	EJ200	MTR390	
	RB199		

1 incl. military applications: F108, F138 and V2500-E5
2 Maintenance conducted by MTU Aero Engines
3 Cooperation with German armed forces = Maintenance within the scope of the cooperation with Germany's armed forces
NDT = low-pressure turbine, NDV = low-pressure compressor, HDV = high-pressure compressor, HDT = high-pressure turbine,
TCF = turbine center frame, MDV= medium-pressure compressor, MDT = medium-pressure turbine

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List of charts and tables

Financial calendar

April 26, 2023	Quarterly Statement as of March 31, 2023
	Conference calls with journalists, analysts and investors
May 11, 2023	Annual General Meeting
July 26, 2023	Interim Report as of June 30, 2023
	Conference calls with journalists, analysts and investors
October 25, 2023	Quarterly Statement as of September 30, 2023
	Conference calls with journalists, analysts and investors

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The annual report follows the rules for the use of inclusive language at MTU.

This annual report of MTU Aero Engines AG is also available in German. It can be found as a PDF in German and English on the MTU website.

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