

Heraeus

Financial report 2023

Key financial indicators for the Group

	2023	2022*	Change (%)
Financial performance (€ million)			
Revenue excluding precious metals	2,862	2,900	- 1.3
Total revenue	25,649	29,082	- 11.8
Earnings before interest, tax, depreciation, amortization, and impairment (EBITDA)	846	956	- 11.5
Earnings before interest and tax (EBIT)	620	695	- 10.8
Profit before taxes (EBT)	595	684	- 13.0
Profit after taxes	444	505	- 12.1
Financial position (€ million)			
Total assets	7,318	7,152	+ 2.3
Shareholders' equity	4,681	4,541	+ 3.1
Equity-to-assets ratio (%)	64	63	
Cash flow (€ million)			
Net cash provided by operating activities	634	692	- 8.4
Cash payments for investments in non-current assets	360	288	+ 25.0
Depreciation, amortization, and impairment of non-current assets (excluding right-of-use assets)	203	233	- 12.9
Employees			
Employees at year-end	15,170	15,938	- 4.8
In Germany	4,750	5,375	- 11.6
Outside Germany	10,420	10,563	- 1.4

* Prior-year figures restated, see Note (2) to the consolidated financial statements.

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Heraeus 2025

In the next 5–10 years, we expect some tectonic changes in the geopolitical landscape, social ecosystems, and the overall business environment

Furthermore, technological advancement and rapidly changing customer demands in relevant markets of the Heraeus Group will lead to increasing competitive pressure on one side and new business opportunities on the other side

To continue the history of the Heraeus Group, to continue our path of sustainable growth, and to create superior value for our shareholders, we will be focusing on six major areas of activities until 2025:

- 1.** We will strengthen the Heraeus Group's portfolio of diversified businesses with substantial investments.
- 2.** We will develop the degree of independence of the individual businesses of the Heraeus Group to enable the businesses to focus on their specific missions and opportunities.
- 3.** We will improve the competitiveness of each of the Heraeus Group's businesses through customer focus, innovation, and excellence to outperform the competition.
- 4.** We will leverage partnerships, networks and cooperation with market participants, customers, suppliers, and other partners to achieve great results.
- 5.** We will make the Heraeus Group and its businesses an attractive place to work.
- 6.** We will strengthen the influence of ESG* criteria on business decisions.

* Environmental, social, and corporate governance

Letter from the Board of Managing Directors

Dear shareholders,

High energy prices, interest rates, and inflation were prominent sources of uncertainty in many of our markets in 2023. Geopolitical developments also remained very challenging. The war in Ukraine rumbles on, while the Hamas terror attack on Israel led to a further serious escalation of the conflict and even more volatility in the world. We are also looking on with concern at the resurgence of anti-democratic forces in Germany and many other countries.

As a Group, we are responding to these challenges by being as flexible as possible and by concentrating on the things that we can influence, i.e. customer focus, excellence, and innovation – in our areas of responsibility and in our day-to-day work.

In spite of all these challenges, we still managed to achieve positive results in the reporting year. The Group's total revenue amounted to €25.6 billion in 2023. Revenue excluding precious metals went down by 1.3 percent year on year to €2.9 billion. Adjusted for currency effects, it increased by 1.8 percent. Profit after taxes came to €444.2 million.

Many of our operating companies are on a stable growth trajectory and benefited from upbeat market conditions. However, we did face a weaker market environment in the electronics and semiconductor segments.

Our operating companies were able to position themselves in important future areas of business during the reporting year. Heraeus Precious Metals, for example, unveiled a new ruthenium-based catalyst for producing green hydrogen. This catalyst will be a key component in scaling up the use of hydrogen as a green source of energy. Heraeus Electronics, meanwhile, presented an innovative pressure sinter paste that is based entirely on a copper powder. The product will further reduce the costs of making power electronics while providing excellent performance in terms of conductivity and reliability.

In addition to these innovations, 2023 saw us invest a record sum in either expanding or building new facilities for our operating companies around the world. This included investments in the expansion of the Heraeus Medevio site in Costa Rica and in a new smelter in Wartburg, Tennessee. In Germany, we completed a key expansion project at Heraeus Conamic in Kleinostheim. And in China, new sites are currently under construction for Heraeus Electro-Nite, Heraeus Conamic, and Heraeus Precious Metals' joint venture with BASF.

We reorganized our various operations into business platforms in the reporting year. The grouping into the platforms Metals and Recycling, Healthcare, Semiconductor and Electronics, and Industrials will allow us to manage the Heraeus Group as a whole even more effectively. Aligned with these four platforms, we make targeted investments in start-ups. They will help to improve our positioning in important future markets and give us access to new technologies. By way of example, the start-up aiXscale is paving the way for new computing solutions that take up less space and consume less energy while maintaining high data transfer rates.

The company Zadiant was another investment that we made in the semiconductor industry. It specializes in making silicon carbide – a semiconductor material that is currently gaining rapid traction in the electric vehicles industry.

We disposed of two operating companies in 2023, both of which we firmly believe will be able to perform better under other owners than within our own platforms. Heraeus Nexensos was sold to Taiwan's Yageo Group, and we also completed the sale of Heraeus Noblelight to Excelitas Technologies in the US.

We made encouraging progress in terms of sustainability. All operating companies committed to carbon targets aligned with the objective of limiting global warming to 1.5°C. We also published the Heraeus Group's latest sustainability report, which describes the targets for the ESG criteria and the successes already achieved. Furthermore, most of our operating companies set their own diversity, equity, and inclusion (DEI) targets and are now working on their implementation.

In the face of numerous crises and rapid changes, we will need to remain proactive and prudent in the way that we do business. All forecasts point to 2024 being a challenging year in which markets are expected to be weak overall.

For this reason, we must make a big effort across all operating companies to maintain a healthy balance between opportunity and risk, keep our costs in check, and make our processes even leaner.

However, we will also be looking for the Group to exploit the potential offered by the creation of new value chains and innovations and to expand the activities of our operational businesses. We are confident that our operating companies will continue to have good opportunities in their markets in 2024.

Our heartfelt thanks go to all employees of the Heraeus Group for their hard work and dedication in what was a challenging but also successful year.

The Board of Managing Directors of Heraeus Holding GmbH



Jan Rinnert
Chairman



Dr. Frank Stietz



Rolf Wetzel

Management and supervisory bodies of Heraeus Holding GmbH

Board of Managing Directors of Heraeus Holding GmbH

Jan Rinnert Chairman

Dr. André Kobelt (until December 31, 2023)

Dr. Frank Stietz

Rolf Wetzel

Supervisory Board of Heraeus Holding GmbH

Franz Haniel Chairman

Florian Pieroth Vice Chairman

Dr. Simone Bagel-Trah

Dr. Markus Binder

Dr. Hans-Tjabert Conring

Dr. Martina Gieg

Birgit Heraeus-Roggendorf

Dr. Hubert Lienhard

Annette Lukas

Uwe Raschke

Peter Schuld

Christian Stübing

Report of the Supervisory Board

**Dear shareholders,
dear readers,**

The Heraeus Group delivered encouraging results again in 2023. Despite it being another year shaped by multiple geopolitical crises and unexpected developments, the Heraeus Group performed well amid difficult market conditions thanks to its consistent focus and long-term strategy. These difficult conditions will remain a relevant factor in 2024 as well.

The Board of Managing Directors made determined progress in taking the Heraeus Group forward in alignment with its long-term strategic goals. Its efforts were mainly focused on (1) continuing to align the operating businesses with the four new business platforms of Metals & Recycling, Healthcare, Semiconductor & Electronics, and Industrials, and (2) making the individual operating companies more competitive, particularly in terms of their customer focus, innovation, excellence, and digitalization functions. Moreover, the individual business units took advantage of strategic opportunities in their markets, including in regard to environmental, social, and corporate governance (ESG) criteria, the reduction of carbon emissions, and efficient cost management.

Dialogue with the Board of Managing Directors

In 2023, the Supervisory Board diligently performed the monitoring and advisory duties incumbent upon it by law, the articles of association, and its rules of procedure, and maintained a close dialogue with the Board of Managing Directors. It was also regularly and comprehensively updated about significant business transactions.

In the Supervisory Board meetings, the Board of Managing Directors reported on current business performance and the further development and prospects of the individual business units, and provided a summary report of the performance of the Group as a whole. The Supervisory Board and the Board of Managing Directors discussed all fundamental matters of corporate policy, business performance, organization, and strategy in depth at these meetings, giving particular attention to the Group's risk situation and risk management systems, compliance issues, and Group Internal Audit. The Board of Management also briefed the Supervisory Board on the Group's performance over the course of the year by means of quarterly reports. Acquisition and transaction projects within the Heraeus Group were another important topic of discussion.

Business transactions requiring Supervisory Board approval in accordance with the law and the articles of association

were presented, scrutinized, and discussed in detail at the meetings and information events. The Supervisory Board voted on the reports and on the proposed resolutions of the Board of Managing Directors, in so far as this was required by law and the articles of association, after having comprehensively reviewed and discussed them. Any questions raised were answered in detail by the Board of Managing Directors.

In addition to the meetings mentioned above, the Chairman of the Supervisory Board also maintained close contact with the Board of Managing Directors. He was regularly and comprehensively informed without delay of significant business transactions and current events of importance for assessing the situation and performance of the Heraeus Group and its management. He also advised the Board of Managing Directors in its strategic decisions, in particular with regard to acquisition and transaction projects within the Heraeus Group.

Throughout the reporting period, the Supervisory Board comprehensively fulfilled its duty to monitor the Board of Managing Directors.

Supervisory Board meetings, written resolutions, and information events

Four meetings of the Supervisory Board took place in 2023, along with four information events. Three written resolutions were circulated for approval outside the meetings. The Board of Managing Directors also kept the Supervisory Board regularly and comprehensively informed of all current issues and provided it with the current risk report.

As is customary, all meetings took place in an open and constructive atmosphere both within the Supervisory Board and vis-à-vis the Board of Managing Directors.

The Board of Managing Directors provided detailed and exhaustive answers to questions from members of the Supervisory Board ahead of, during, and after the meetings and information events.

In a video conference/information event held on January 26, 2023, the Board of Managing Directors gave another update on the proposed equity investment in the start-up Smart Steel Technologies GmbH.

The Supervisory Board approved the acquisition of up to 50 percent of the shares in Smart Steel Technologies GmbH

by means of a written resolution over the period January 27, 2023 to February 3, 2023.

At a meeting held on March 2, 2023, the Board of Managing Directors reported to the Supervisory Board in detail on Heraeus Conamic and gave an update on the planned acquisition of OFS Fitel Denmark ApS.

The Supervisory Board approved the acquisition of 100 percent of the shares in OFS Fitel Denmark ApS by means of a written resolution over the period February 27, 2023 to March 30, 2023.

In a video conference held on March 28, 2023, the Board of Managing Directors provided the Supervisory Board with a detailed update on the Heraeus Group's current M&A activities.

On March 31, 2023, the Board of Managing Directors announced the completion of the sale of Heraeus Nexensos GmbH and the conclusion of an agreement to purchase 100 percent of the shares in OFS Fitel Denmark ApS.

At its meeting on April 27, 2023 the Supervisory Board was briefed on the 2022 financial year, on the performance of the business, and on current M&A projects. The ESG reporting focused on the Heraeus Group's decarbonization activities. The Chairman of the Audit Committee also reported in detail on the committee's work and discussed, in the presence of the auditors, the single-entity financial statements of Heraeus Holding GmbH and the consolidated financial statements of Heraeus Holding GmbH for the year ended December 31, 2022, in each case including the management report. As no objections were raised to these financial statements, the Supervisory Board approved them, along with the resolution on the appropriation of profit proposed by the Board of Managing Directors, after careful review and thorough deliberation. An increase to the borrowing framework was discussed and approved. Planned changes to the articles of association were also presented and the agenda for the next shareholders' meeting was signed off.

At its meeting on June 3, 2023, the Supervisory Board thoroughly discussed the agenda of the subsequent shareholders' meeting. The Board of Managing Directors provided a detailed report on key financials and progress with current M&A projects.

The information event on June 27, 2023 was held mainly to report on the plans that had been presented for the sale of 100 percent of the shares in Heraeus Noblelight GmbH.

Subsequent to the information event, the Supervisory Board approved the sale of 100 percent of the shares in Heraeus Noblelight GmbH by means of a written resolution over the period June 27, 2023 to July 11, 2023.

In a video conference held on August 23, 2023, the Board of Managing Directors updated the Supervisory Board on the Heraeus Group's current M&A activities.

In a letter dated September 14, 2023, the Board of Managing Directors notified the Supervisory Board of the conclusion of an agreement for the sale of 100 percent of the shares in Heraeus Noblelight GmbH to Excelitas Technologies Corporation.

In a letter dated November 8, 2023, the Board of Managing Directors notified the Supervisory Board that Dr. André Kobelt would be leaving the Board of Managing Directors of Heraeus Holding GmbH and therefore also the Heraeus Group with effect from the end of December 31, 2023.

In a letter dated November 13, 2023, the Board of Managing Directors notified the Supervisory Board of the purchase of a minority interest in the start-up Zadiant.

The Board of Managing Directors presented the Supervisory Board with the current risk report on November 29, 2023.

At the meeting on December 14, 2023, the Board of Managing Directors reported on the ongoing business situation, strategic topics, and progress with several M&A projects.

The meeting also received a presentation on the Heraeus Group's financial planning for 2024 to 2026, including the borrowing framework. The planning was reviewed in depth and approved.

In addition, the Board of Managing Directors provided a comprehensive report on the new owner strategy and vision for 2030. The ESG reporting concentrated on the human resources report for 2023 with its focus on talent development, recruitment of skilled workers, training, and DEI (diversity, equity, and inclusion).

The Heraeus Group's activities and early successes in the field of artificial intelligence were also presented, as was the 2023 sustainability report, which was made available to the members of the Supervisory Board during the meeting.

The report on the review in accordance with the European Market Infrastructure Regulation (EMIR) was provided to the Supervisory Board together with the invitation to this meeting.

Meetings and resolutions of the committees

The Supervisory Board's Audit Committee met three times in 2023.

At its meeting on March 30, 2023, the Audit Committee mainly discussed the single-entity and consolidated financial statements for 2022, including the auditor's key audit points. In addition, the Board of Managing Directors provided a risk management report and an overview of current M&A projects. The meeting was attended by the auditors from Ernst & Young GmbH Wirtschaftsprüfungsgesellschaft who were responsible for the audit. The Audit Committee also addressed the selection of the new auditors of the single-entity and consolidated financial statements.

At its meeting on September 26, 2023, the Audit Committee primarily dealt with the Group's 2023 half-year report and with current business performance, and discussed the key areas of focus for the audit of the 2023 annual financial statements. It also received reports on the current status of M&A projects.

On November 14, 2023, the Board of Managing Directors presented the Audit Committee with a detailed written analysis of earnings from the precious metals business in 2022 for Heraeus Precious Metals GmbH & Co. KG in Hanau.

The meeting on December 14, 2023 mainly focused on the ongoing business situation, the responsibility management system, the risk management system, and Group Internal Audit. Other agenda items covered the key audit points for the 2023 consolidated financial statements as proposed by the auditors. A report was also received on the CSRD (Corporate Sustainability Reporting Directive) project. Finally, an update and a report were provided on the measures initiated in relation to potential cyber-crisis scenarios.

At the Supervisory Board meetings that followed each of these meetings, the Chairman of the Audit Committee reported comprehensively on the committee's activities.

Meetings of the Presidial Committee of the Supervisory Board

The Presidial Committee convened twice in the reporting year.

On October 16, 2023, it made changes to the Managing Director employment contract of Dr. Frank Stietz and to the term of the Managing Director employment contract of Dr. André Kobelt.

The Presidial Committee also met on December 28, 2023 to discuss the post-contractual non-compete covenant applicable to Dr. Kobelt.

Mediation Committee meetings

Meetings of the Mediation Committee were not necessary during the reporting period.

Single-entity financial statements of Heraeus Holding GmbH and consolidated financial statements of the Heraeus Group

The single-entity financial statements and management report of Heraeus Holding GmbH as well as the consolidated financial statements and group management report of the Heraeus Group for 2023 were audited for the first time by KPMG Wirtschaftsprüfungsgesellschaft, Berlin, and given an unqualified audit opinion.

The Supervisory Board issued the engagement for these audits at its meeting on April 27, 2023. The shareholders approved the audit engagement at the shareholders' meeting on June 3, 2023.

In addition, the Supervisory Board's Audit Committee discussed the single-entity financial statements of Heraeus Holding GmbH and the consolidated financial statements for 2023, together with the related audits, at its meeting on March 21, 2024. The Audit Committee accepted the findings of the audits with no objections. The auditor also participated in this meeting.

The single-entity financial statements and the management report of Heraeus Holding GmbH and the consolidated financial statements and group management report of the Heraeus Group for 2022, along with the auditors' reports, were made available to all members of the Supervisory Board in advance of the full Supervisory Board meeting on April 24, 2023.

At the meeting, the auditors participated in the Supervisory Board's discussion of the documents to be reviewed. They reported on the most important findings of their audit and were available to answer questions.

The Supervisory Board comprehensively reviewed the single-entity financial statements and management report of Heraeus Holding GmbH, together with the consolidated financial statements and group management report of the Heraeus Group, prepared for the 2023 financial year, including the associated audit reports. The Supervisory Board's concluding findings of its own review were that there were no objections to be raised. Accordingly, the Supervisory Board approved the single-entity financial statements and management report of Heraeus Holding GmbH, along with the consolidated financial statements of Heraeus Holding GmbH and the group management report.

The Supervisory Board reviewed and approved the Board of Managing Directors' proposal for the appropriation of profits.

Corporate governance

Internal policies were complied with at all times during the reporting period, which was monitored by the Supervisory Board.

There were no known conflict of interests either for members of the Board of Managing Directors or for members of the Supervisory Board during the reporting period.

As a precaution, one member of the Supervisory Board did not participate in reports, discussions, and voting in relation to the purchase of an equity investment due to a potential conflict of interest.

Personnel matters relating to the Supervisory Board of Heraeus Holding GmbH

No changes were made to the Supervisory Board's personnel during the reporting period.

Changes to the Board of Management of Heraeus Holding GmbH

For personal reasons, Dr. André Kobelt decided to relinquish his duties as Managing Director of Heraeus Holding GmbH with effect from the end of December 31, 2023.

Thanks

The Supervisory Board would like to offer special thanks to all members of senior management and the works councils of the Heraeus Group for their dedication and constructive support in taking the Heraeus Group forward, and to each and every employee for working so hard and so successfully throughout the year.

Hanau, April 24, 2024
The Supervisory Board

A handwritten signature in blue ink, appearing to read 'F. Haniel', is written over a light blue horizontal line.

Franz Haniel
Chairman

Group management report. In 2023, Heraeus exceeded the forecast profit after taxes. However, it was unable to match the very good results achieved in 2022. Performance was boosted by the focused implementation of operational improvements, persistently high market volatility in the precious metal business, and effective cost-reducing measures. The financial position remains stable and is characterized by a high equity ratio and a robust funding structure as well as a strong cash balance for further capital expenditure on infrastructure and production capacities.

Fundamentals of the Group

Business model

The Heraeus Group is a broadly diversified, world-leading, family-owned technology business based in Hanau, Germany. The company can trace its roots back to a pharmacy opened by the family in 1660. Heraeus currently groups its wide-ranging operations into the Business Platforms Metals & Recycling, Healthcare, Semiconductor & Electronics, and Industrials. Based on its range of products, the Group is one of the leading providers in each of its global sales markets. These include the markets for electronics, semiconductors, telecommunications, automotive products, chemicals, medical equipment, pharmaceuticals, steel, and photovoltaics.

Since 2023, the businesses under the umbrella of Heraeus Holding have been grouped into the following four Business Platforms. The Business Platform Metals & Recycling is for activities connected with metals, particularly precious metals, and with the circular economy. In the Healthcare Business Platform, Heraeus supplies its customers with materials and technologies for use in medical equipment, orthopedics, and infection management. The Business Platform Semiconductor & Electronics offers technologies, materials, integrated material solutions for packaging technology, electrochemical solutions, semiconductor applications, and optical fibers for telecommunications. The Business Platform Industrials provides its customers with materials and technologies for applications in industrial production. This includes products for the photovoltaics industry and measurement equipment for molten metal processes.

Heraeus Holding is responsible for the corporate strategy of the Group, which controls the Business Platforms. Preserving the long-term independence of the Group has priority in all corporate decisions. The key financial performance indicators relevant to the management of the business are revenue excluding precious metals, profit before taxes (earnings before tax, EBT), earnings before interest and tax (EBIT), earnings before interest, tax, depreciation and amortization (EBITDA), and profit after taxes.

With over 130 companies and more than 15,100 employees, Heraeus maintains a presence in the key economic regions of the world in order to capitalize on growth opportunities around the globe.

Research and development

Technological expertise and innovation capabilities are the key drivers of success for Heraeus. The Group currently holds over 1,000 patent families, with property rights in various countries, and employs more than 920 people worldwide in research and development (R&D). Its R&D expenditure in 2023 amounted to €172.9 million.

Numerous interdisciplinary and international R&D projects were initiated and progressed last year. The following sections provide a detailed description of the key activities in the individual Business Platforms.

Economic report

Macroeconomic and sector-specific conditions

In 2023, the global economy gradually recovered from the challenges it had faced previously due to the worldwide coronavirus pandemic and to Russia's invasion of Ukraine and the subsequent energy crisis in Europe. Nevertheless, the war in Ukraine continued to have an impact on the energy and food markets. Interest rates stabilized at an elevated level over the course of the year, while the still high rates of inflation gradually began to fall. This was no complete return to pre-pandemic conditions, however. Economic growth weakened as a result of these developments, but did not come to a standstill. Growth remained sluggish and uneven, with the advanced economies more heavily affected by the slowdown than the emerging markets and developing countries. The latest figures published by the International Monetary Fund (IMF) predict that the global economy will have expanded by 3.1 percent in 2023 compared with the previous year.

Growth rates varied across the individual regions and countries. Whereas the growth of the US economy held steady at 2.5 percent (2022: 1.9 percent), the eurozone added just 0.5 percent (2022: 3.4 percent). Germany lagged behind other countries again, with its economy contracting by 0.3 percent (2022: growth of 1.8 percent). The economies of emerging markets and developing countries recorded growth of 4.1 percent (2022: 4.1 percent). The easing of COVID-related restrictions was the main reason why growth in China rose to 5.2 percent (2022: 3.0 percent) despite it being dampened by the worsening crisis in the country's real estate sector.

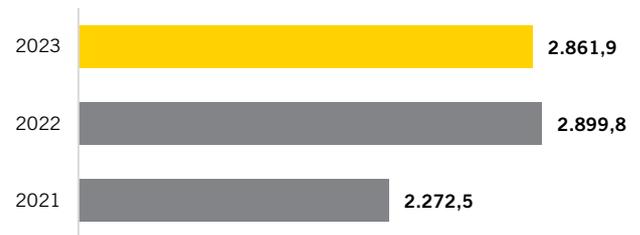
Like most other markets, the sales markets served by Heraeus were not immune to these trends in 2023, with several of them experiencing a downturn.

The semiconductor market contracted significantly in 2023 following two years of strong growth. This was primarily due to the weakening of the end market for consumer electronics. Growth in semiconductor fabrication for the automotive industry and AI applications only partially compensated for the decline. Based on current estimates, global chip production fell by 14 percent compared with the previous year. Capital expenditure on semiconductor manufacturing facilities was down by around 6 percent.

Global demand for optical fibers for telecommunications fell sharply following a record year in 2022. This decrease was partly attributable to the macroeconomic conditions, with both inflation and interest rates at elevated levels. Demand was also down in the two biggest markets, China and the US. The positive effects expected from support programs,

particularly in the USA, had not yet materialized because of delays in 2023.

Revenue excluding precious metals
€ million

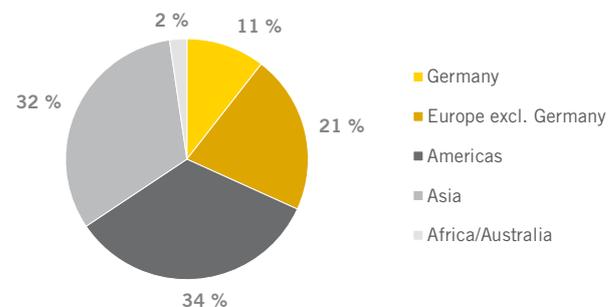


The photonics market (optics industry focusing on research, medical equipment, and laser technology) expanded slightly in 2023. Growth in the medical business remained strong, but the industrial market and the market for semiconductor applications weakened year on year.

Steel production, which had declined in 2022, held steady in 2023. The year was beset by many different challenges, which resulted in a challenging market environment. This situation was primarily caused by inflation-related uncertainty, monetary policy tightening, the impact of Russia's invasion of Ukraine, and the fallout from the real estate crisis in China.

Demand for medical solutions increased again in 2023. However, growth in the market did slow because the catch-up effects following the coronavirus pandemic were less of a factor than in the prior year and because inventories were used up over the course of the year.

Revenue excluding precious metals by region 2023

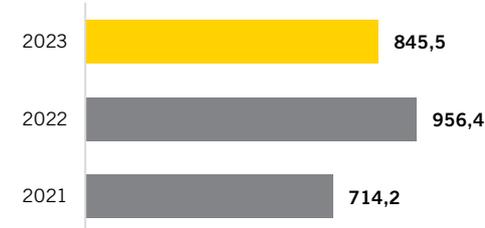


Comparison between actual and forecast business performance

Revenue excluding precious metals was projected to grow at a moderate rate in 2023. However, it fell short of this forecast, falling by 1.3 percent year on year to €2.9 billion. This decline compared with the revenue excluding precious metals generated in 2022 was due to negative currency effects and the sale of the sensors business (completed March 31, 2023).

When looking at total revenue, it must be borne in mind that this figure is heavily influenced by the volatility of precious metal prices and is therefore not included in the outlook.

Earnings before interest, tax, depreciation, amortization, and impairment (EBITDA)
€ million



Profit before taxes (earnings before tax, EBT), earnings before interest and tax (EBIT), earnings before interest, tax, depreciation and amortization (EBITDA), and profit after taxes were predicted to fall strongly for 2023.

Earnings before interest and tax (EBIT)
€ million



At €444.2 million, the profit after taxes generated in 2023 was higher than predicted. This was also the case for the other key profit indicators. Profit after taxes fell overall in 2023 compared with the previous year. This decline was caused primarily by the return to normality in the precious metal markets and by the absence of the positive non-recurring item that had boosted the 2022 result (which included the settlement payment from Zimmer Biomet).

Profit after taxes
€ million



Consolidated income statement

€ million	2023	2022*	Change
Revenue	25,649.2	29,082.2	- 3,433.0
Cost of materials incl. change in inventories	- 23,324.8	- 26,771.2	+ 3,446.4
Personnel expenses	- 1,129.2	- 1,098.4	- 30.8
Other operating income	161.1	209.8	- 48.7
Other operating expenses	- 537.5	- 518.7	- 18.8
Impairment gains (+) / losses (-) on trade receivables	- 1.5	- 4.5	+ 3.0
Income from investments accounted for using the equity method	28.2	57.2	- 29.0
Earnings before interest, tax, depreciation, amortization, and impairment (EBITDA)	845.5	956.4	- 110.9
Amortization, depreciation, and impairment	- 225.7	- 261.2	+ 35.5
Earnings before interest and tax (EBIT)	619.8	695.2	- 75.4
Net finance costs	- 24.4	- 10.8	- 13.6
Profit before taxes (EBT)	595.4	684.4	- 89.0
Income taxes	- 151.2	- 179.8	+ 28.6
Profit after taxes	444.2	504.6	- 60.4

* Prior-year figures restated, see Note (2) to the consolidated financial statements

Business performance, financial position, and financial performance

Total revenue fell from €29,082.2 billion to €25,649.2 billion, a year-on-year fall of 11.8 percent. Revenue excluding precious metals decreased by 1.3 percent year on year to €2.9 billion. Adjusted for currency effects, it increased by 1.8 percent.

The Americas was the strongest region in terms of revenue excluding precious metals, accounting for 33.8 percent of the total. Revenue in this region rose by 3.9 percent year on year. A year-on-year decrease in revenue excluding precious metals was reported in Europe (down by 0.3 percent).

Detailed breakdowns of revenue performance in the individual Business Platforms are provided in the subsequent sections.

The Group's earnings before interest and tax (EBIT) amounted to €619.8 million in 2023, a €75.4 million decrease on the prior-year figure of €695.2 million.

Personnel expenses went up by €30.8 million to €1,129.2 million in the reporting year. This included positive currency effects of €18.7 million (2022: negative currency effects of €44.2 million) and positive effects of €21.6 million from the sale of the sensors business. Adjusted for these non-recurring items, personnel expenses were around 6.7 percent higher than in the previous year.

Depreciation, amortization, and impairment amounted to €225.7 million, a decrease of €35.5 million compared with the previous year. This figure included impairment losses of €14.0 million (2022: €45.3 million), which mainly related to impaired technical equipment and office furniture and equipment that could no longer be used as planned.

Other operating income fell by €48.7 million year on year to €161.1 million. In 2022, this figure had included income of €137.5 million from a settlement agreement resolving long-standing legal disputes. In 2023, it included income totaling €111.6 million from the sale of the sensors and specialty light sources businesses. Impairment gains (+) / losses (-) on trade receivables came to €- 1.5 million in the reporting year (2022: €- 4.5 million).

Consolidated balance sheet

€ million	Dec. 31, 2023	Dec. 31, 2022*	Change
Non-current assets	3,243.3	3,127.2	+ 116.1
Current assets	4,074.4	4,025.0	+ 49.4
Total assets	7,317.7	7,152.2	+ 165.5
Shareholders' equity	4,681.0	4,541.2	+ 139.8
Non-current liabilities	1,253.7	1,211.0	+ 42.7
Current liabilities	1,383.0	1,400.0	- 17.0
Total shareholders' equity and liabilities	7,317.7	7,152.2	+ 165.5

* Prior-year figures restated, see Note (2) to the consolidated financial statements

Other operating expenses went up by €18.8 million to €537.5 million in the reporting year. The increase was mainly due to foreign currency losses (up by €18.2 million).

The contribution from associates to earnings before interest and tax fell by €29.0 million to €28.2 million (2022: €57.2 million). This decrease was largely attributable to a lower contribution from the associate in Japan and to impairment of the shares held in an American equity investment.

Net finance costs deteriorated by €13.6 million year on year to €- 24.4 million, primarily because the figure for 2022 had included income of €25.5 million from the disposal of a miscellaneous investment. Meanwhile, the higher level of interest rates had a positive impact because it meant that cash could be invested at a better rate than in the prior year (up by €16.2 million).

Profit before taxes came to €595.4 million, a year-on-year decrease of €89.0 million. The tax rate edged down from 26.3 percent in 2022 to 25.4 percent in the reporting year.

Profit after taxes amounted to €444.2 million in 2023 (2022: €504.6 million).

The Heraeus Group's financial position was further consolidated in 2023. Heraeus continues to have a healthy balance sheet, hold a substantial cash balance, and benefit from a secure medium and long-term funding base. At the end of 2023, the Heraeus Group's total assets amounted to €7,317.7 million, a small year-on-year increase of €165.5 million. The Group's equity ratio was higher than in the previous year at 64.0 percent (2022: 63.5 percent).

Non-current assets increased by €116.1 million year on year to €3,243.3 million. The company invested €359.7 million in property, plant, and equipment and intangible assets excluding right-of-use assets. Depreciation/amortization and impairment losses amounted to €202.9 million and currency translation losses to €52.7 million. Equity-accounted investments increased by €33.8 million, mainly due to the acquisition of two equity investments. Deferred tax assets rose by €10.6 million to €127.4 million.

Current assets went up by a total of €49.4 million year on year to €4,074.4 million. This mainly reflects the overall increase of €301.5 million in cash and cash equivalents and time deposits, and a countervailing decrease of €211.5 million in precious metal inventories.

Non-current liabilities were up by €42.7 million to €1,253.7 million compared with the prior-year balance sheet date. Pensions and similar obligations increased by €21.7 million year on year, mainly as a result of the lower discount rates. Non-current financial debt rose by €15.8 million to €689.8 million, primarily in connection with a long-term financing solution for the investments planned in China. Deferred tax liabilities were €17.3 million higher than in the previous year.

Current liabilities decreased by €17.0 million to €1,383.0 million. Current financial debt went up by €100.5 million to €165.9 million, mainly because of a short-term financing solution taken out to facilitate the sale of the specialty light sources business at the end of 2023. There was a countervailing reduction of €99.9 million in trade payables.

Consolidated cash flow statement

€ million	2023	2022	Change
Net cash provided by operating activities	633.5	692.1	- 58.6
Net cash used for investing activities	- 375.9	- 261.8	- 114.1
Net cash provided by / used for financing activities	- 78.7	- 140.8	+ 62.1
Net change in cash and cash equivalents	178.9	289.5	- 110.6

The Group funds itself centrally via the Corporate Treasury function. Liquidity is secured on the basis of multi-year financial planning in which the Group's operational activities are the principal source of liquidity.

The Group's sources of medium and long-term funding are a corporate bond issued in June 2022 with a term through to 2027 and two directly placed bonds with terms through to 2032 and 2034. To fund its short-term financial requirements, the Group has access to a commercial-paper program, a long-term, committed syndicated loan facility, and bilateral loan facilities. Neither the commercial paper program nor the syndicated loan facility had been utilized at the end of 2023. The Trading units also use precious metal leasing for short-term funding. At the end of 2023, the total market value of the precious metals on loan from third parties amounted to €1,947.0 million (2022: €1,767.0 million).

The net cash provided by operating activities amounted to €633.5 million in the reporting year (2022: €692.1 million). The main contributory factors were profit after taxes of €444.2 million and the non-cash balance from amortization, depreciation, and impairment and reversal of impairment in the amount of €225.7 million. After adjusting for acquisitions, sales of divisions, and non-cash currency effects, inventories had fallen year on year by €100.9 million and trade payables by €85.0 million. Conversely, trade receivables increased by €17.1 million. The change in other net assets amounting to €105.0 million is largely attributable to a payment of €46.5 million made as part of a settlement agreement resolving a legal dispute and to the changes in the margin accounts (€34.9 million) and in the balance of tax receivables/liabilities (€30.2 million). Other non-cash transactions and other non-operating income/expenses essentially comprised the income from the sales of the specialty light sources and sensors businesses (€111.6 million) and the pro rata net profit for the year of the equity-accounted investments (€28.2 million).

The net cash used for investing activities of €375.9 million mainly comprised payments for investments in non-current assets (€359.6 million), payments used to purchase time deposits (€128.0 million), payments for the acquisition of equity-accounted entities (€34.7 million), and payments for acquisitions after deduction of acquired liquid assets (€32.4 million). Countervailing cash flows largely consisted

of receipts from disposals of business units (€189.4 million) and interest received of €35.9 million.

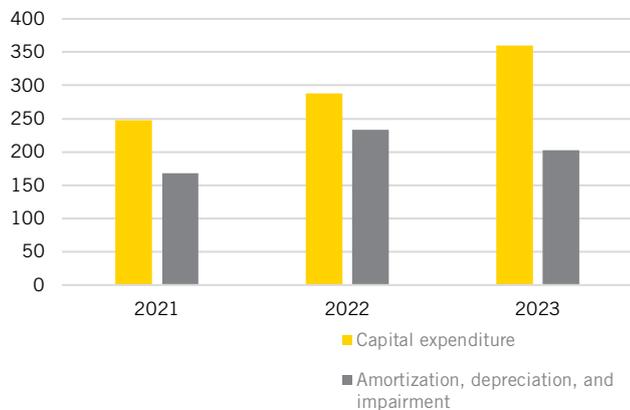
The net cash used for financing activities of €78.7 million mainly comprised distributions totaling €112.0 million and interest payments totaling €49.2 million. The proceeds from the issuing of interest-bearing liabilities resulted in a cash inflow of €132.3 million, whereas payments relating to the redemption of interest-bearing liabilities led to a cash outflow of €30.1 million.

Consequently, there was an increase in cash and cash equivalents of €178.9 million.

The Group's liquidity reserves (cash and cash equivalents and time deposits) rose by a total of €301.5 million to €1,236.0 million. This means that the Group's financial position remains robust, which will enable it to continue to actively develop its businesses and position itself in the market.

Overall, the Group's financial performance in 2023 was satisfactory. The financial position remains stable and is characterized by a high equity ratio and a robust funding structure as well as a strong cash balance for further capital expenditure on infrastructure and production capacities.

Cash capital expenditure and amortization, depreciation, and impairment of non-current assets
 € million



Capital expenditure and divestments

In 2023, Heraeus recognized additions to property, plant, and equipment and intangible assets of €359.7 million (2022: €287.7 million). In addition, there were purchase commitments of €93.0 million at the year-end that can be met using the available cash and cash equivalents.

Further progress was made last year with the initiatives to modernize and expand the operational sites. Alongside the ongoing projects to expand the Hanau and Kleinostheim sites, further expansion work was carried out at the sites in other parts of Europe and in the US and Asia.

The acquisition of the optical fiber production facility of OFS Fitel Denmark ApS, based in Denmark, strengthened the Business Platform Semiconductor & Electronics. The takeover gives the Business Platform the opportunity to enter the European market for optical fiber manufacturing.

The acquisition of shares in Berlin AI start-up Smart Steel Technologies saw Heraeus broaden its activities in the Business Platform Industrials.

In 2022, the Group reached an agreement with Taiwan-based international electronics specialist Yageo for the sale of the sensors business. The sensors business had been headquartered in Kleinostheim and operated an additional production site in Malaysia as well as sales units in the US, China, and other South East Asian countries. It employed around 480 people. The sale was completed in the first half of 2023.

In 2023, Heraeus reached an agreement with US photonics company Excelitas Technologies for the sale of the specialty light sources business. The specialty light sources business had been headquartered in Kleinostheim and operated additional production sites in Germany, the UK, the US, and China, as well as sales units in Europe, Japan and parts of South East Asia. It employed around 850 people. The sale was completed in December 2023.

Business Platform Metals & Recycling

The Business Platform Metals & Recycling focuses on the development of sustainable technologies and materials based on metals, particularly precious metals, and on the circular economy. As a precious metal specialist, Heraeus has extensive expertise in the manufacturing of industrial products containing precious metals for various applications. It provides services throughout the precious metal cycle, from procurement, through processing, to recycling. Coating and refining processes along with colors and products for the pharmaceutical industry that contain precious metals round off Heraeus' broad expertise in the precious metal cycle. The Business Platform Metals & Recycling also encompasses innovative technologies for amorphous product solutions, PET recycling, and recycling of old rare-earth magnets.

Business performance

Revenue excluding precious metals in the Business Platform Metals & Recycling was up slightly in 2023. Compared with the previous year, this key figure rose by 1.0 percent to €448.8 million.

The increase in the proportion of new products, for example in the hydrogen business, had a positive impact on revenue growth. The strong contributions to earnings from precious metal services, which are heavily influenced by volatility in the precious metal markets, was partly offset by the mixed trends in the end markets with some weaknesses in electronics. Earnings were adversely affected by the sharp fall in prices, particularly for palladium and rhodium.

Revenue excluding precious metals | Business Platform Metals & Recycling € million



Research and development

In 2023, the precious metal solutions business conducted research into the further development of hydrogen applications, catalyst products, and new silver coatings for multiple fields of application. It also explored new processes for recycling complex materials. In addition to these fields of research and development, which will be pursued in the future as well, the authentication and traceability of precious metals is a key research area in this business.

The Business Platform Metals & Recycling also conducts research into amorphous metal alloys and components and their production methods. One part of the business mainly devotes its research and development activities to the production and marketing of recycled magnetic materials. Another, a minority interest of Heraeus, focuses on a technology for chemically recycling PET bottles.

Business Platform Healthcare

Heraeus carries out research on solutions and develops products that contribute to medical progress. The growth in global society and aging demographic structure are driving increasing demand for cutting-edge materials and technologies in the medical sector. Heraeus has a long tradition of involvement in this market; indeed, the company began as a pharmacy, and part of Heraeus' current business entails manufacturing biomaterials for orthopedic products. It is also a supplier to the medical industry, including for products used in therapeutic fields such as cardiac rhythm management, diabetes, and electrophysiology. An additional unit focuses on the manufacture of medical products for minimally invasive, robotics-assisted, and orthopedic surgery. The Business Platform Healthcare also encompasses specialty glass products for an array of medical applications and wound care technologies.

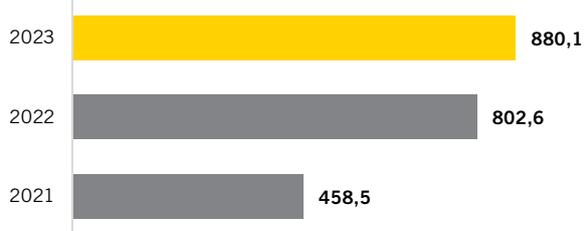
Business performance

The Business Platform Healthcare recorded further significant year-on-year growth in 2023. Compared with 2022, its revenue excluding precious metals was up by 9.7 percent to €880.1 million.

The biomaterials business again generated strong revenue growth. Further market penetration for existing products in the US provided positive impetus for the business performance. In addition, the launch of new products in the US added to the expertise and market potential in the treatment of septic knee replacements.

The medical components and solutions business benefited from global market growth as a result of the post-pandemic recovery, seeing a sharp increase in revenue. The ramp-up of new product launches and a rise in sales volumes, particularly for new product lines, with existing and new customers also contributed to revenue growth. However, revenue was adversely affected by negative currency effects and by a fall in demand in the second half of the year as customers began to use up the high levels of inventory they had built up following the coronavirus pandemic.

Revenue excluding precious metals | Business Platform Healthcare
€ million



Research and development

Based on an established network in the field of infection management, the biomaterials business invested in research and development on an ongoing basis. The focus on product developments was stepped up in 2023.

In the medical components and solutions business, research into neuromodulation solutions and interventional delivery and therapeutic systems was continued.

In the specialty glass business serving the market for medical products and wound care technologies, development activities are directly related to current customer demand for bespoke glass compositions.

Business Platform Semiconductor & Electronics

Digitalization and interconnectedness are proceeding apace around the globe and have become a key element of today's society. The sophisticated materials that Heraeus develops for the automotive industry, power electronics and advanced packaging help customers to make electronic components smaller, longer lasting, and more efficient. In-depth materials expertise and a broad technology portfolio enable Heraeus to provide customized and integrated solutions. Heraeus is also a technology leader in the production and processing of high-purity quartz glass. This is the raw material for the production of optical fiber cables for the telecommunications industry and is used to make components for the production of ever smaller semiconductor chips. The Business Platform Semiconductor & Electronics also offers solutions for innovative coating technologies.

Business performance

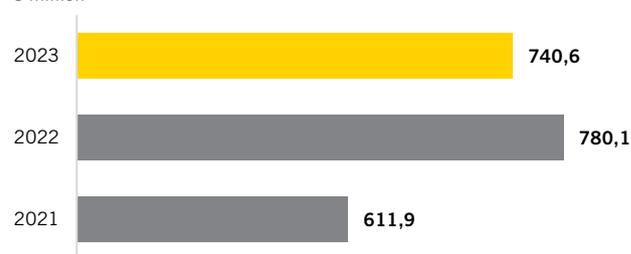
In the Business Platform Semiconductor & Electronics, revenue excluding precious metals fell by 5.1 percent to €740.6 million in 2023. Most of this decrease can be attributed to lower demand in key sales markets.

Revenue growth in the semiconductor applications business and in the packaging technology business for the electronics industry was slower than expected in 2023 and saw a slight decline overall. Both businesses were negatively affected by a contraction of the markets served by the semiconductor industry. The power electronics business, the extreme ultraviolet lithography solutions, and the new ceramics product line for the semiconductor industry saw positive growth.

Revenue in the electrochemicals business fell sharply. A contraction of the market, particularly the consumer electronics market, due to economic conditions was the main reason for this decrease, which was only partially compensated for by growth in automotive electronics and in semiconductor fabrication for AI applications.

End customer demand for optical fibers for telecommunications, which had risen sharply in 2022, fell steeply again in 2023, mainly because of a slowdown in the US and China, Heraeus' two main markets for this business. Demand for glass slumped because substantial inventories had already been built up along the entire value chain.

Revenue excluding precious metals | Business Platform Semiconductor & Electronics
€ million



Research and development

Heraeus is continuously looking for new solutions and products in the packaging technology business. Last year, research and development in this business focused on fine pitch solder pastes, LED solder pastes, sinter materials, thermal interface materials (TIM), and heating elements made from non-precious metals. Heraeus also worked on further developments to the material solution Die Top System (DTS®).

In order to satisfy the increasing requirements of the target markets, the semiconductor applications business forged ahead with development projects in 2023 with the aim of expanding its product portfolio and manufacturing expertise. Even greater efforts were devoted to development activity in the areas of extreme ultraviolet (EUV), synthetic quartz glass, and functional materials.

In the electrochemicals business, Heraeus continued its research and development projects in collaboration with customers in all segments last year.

The focus of the optical fibers for telecommunications business in 2023 remained on new and innovative products and the expansion of the technology portfolio so as to be equipped for the requirements of future generations of fibers.

Business Platform Industrials

Heraeus has long been a partner of choice for industry thanks to the Group's in-depth expertise in high-temperature processes. It is a recognized specialist in measurements for molten steel, iron, and aluminum, continuously developing its portfolio of products that ranges from high-performance sensors to complete measuring systems. The minority interest in a start-up offering AI-based software solutions for the steel industry was added to the Business Platform Industrials at the beginning of 2023. With its photovoltaics products, Heraeus also makes a significant contribution to resource-efficient power generation.

Business performance

The Business Platform Industrials' revenue excluding precious metals fell by a considerable 8.9 percent to €790.9 million in 2023. The sale of the sensors business (completed March 31, 2023) was responsible for most of this decline.

Steel production held steady in 2023, which led to a stable level of global demand for sensors and instruments that improve steel production processes. Demand did vary quite substantially on a regional basis, however. Strict cost control and price adjustments aimed at mitigating the impact of fast-rising costs meant that the business was able to increase its revenue slightly and maintain its profitability.

2023 was a challenging year for the business with silver conductive pastes for solar cells, which ultimately translated into a strong fall in revenue. Delayed product developments and a difficult competitive environment were the main reasons for this decline.

In 2023, Heraeus sold its sensors business to the Taiwan-based international electronics specialist Yageo. The sale was completed in the first half of 2023.

In addition, Heraeus sold its specialty light sources business to the US company Excelitas Technologies, a supplier of photonics products such as light sources, detectors, sensors, and optics. The sale was completed at the end of 2023.

Research and development

The business involving measurement equipment for high-temperature processes continued to research and develop new products aimed at helping to enhance or improve the safety and efficiency of raw material transformation processes and reduce carbon emissions.

The business focusing on silver conductive paste for solar cells continued to develop new products for cutting-edge manufacturing technologies such as TOPCon. It also conducts ongoing research into technologies and materials for making silver conductive pastes more efficient.

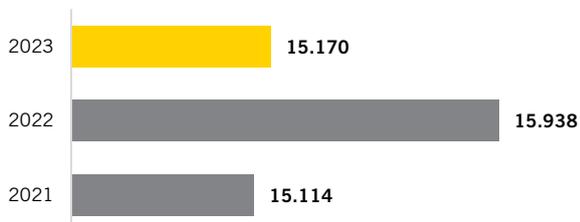
The business involving software solutions for the steel industry focused its research and development activities on integrated solutions for process management and planning systems.

Revenue excluding precious metals | Business Platform Industrials
€ million



People at Heraeus

Number of employees worldwide



Overview: number of employees

As of December 31, 2023, Heraeus had 15,170 employees worldwide (2022: 15,938).

This decrease was mainly due to the sale of the specialty light business to US photonics company Excelitas Technologies and the sale of the sensors business to electronics firm Yageo.

However, there was a countervailing rise in headcount as a result of growth-driven and expansion-related projects and healthy order books in various Heraeus businesses.

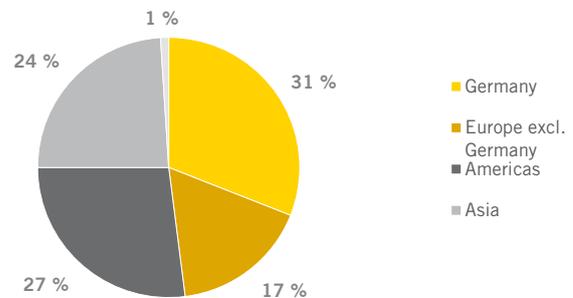
In addition, Heraeus completed the takeover of the optical fiber production facility of OFS Fitel Denmark ApS, based in Denmark, on June 30, 2023. The acquisition gives Heraeus the opportunity to add a new pillar to its business by supplying optical fibers to the European telecommunications market.

Spotlight on voluntary activities at Heraeus

The Heraeus Group believes it is important to meet its responsibilities toward not only customers and partners but also society and the environment.

As an employer, Heraeus supports the voluntary activities of its employees. The Board of Managing Directors recognizes the charitable work of staff around the world under the Group-wide banner 'Giving Back'. And the entire Heraeus organization has been invited to dedicate their efforts to good causes. This has resulted in a host of voluntary initiatives that have been organized independently.

Employees by region in 2023



In India and Costa Rica, for example, employees collected donations for a school and for families in need. In the US, staff supported the work of a food bank in order to help the hungry. Our employees in China provided company and a willing ear to people who are old and lonely. In the Rhine-Main region, 200 employees have registered as stem-cell donors. The members of the Heraeus Board of Managing Directors were also involved personally.

In addition to the many community-based projects, there was also a focus on sustainability. Several teams collected garbage or, as was the case in Singapore, took part in a sustainability run. Other employees entered a bike challenge to cut the amount of miles they travelled by car and thus reduce their personal carbon footprint. The challenge also raised a sum of €5,000 for the benefit of a charitable organization.

Heraeus puts diversity, equity, and inclusion on the agenda for the entire Group

In 2023, the focus of Heraeus' HR policy was on diversity, equity, and inclusion (DEI) as a mission-critical, Group-wide topic that is embedded in the company's vision for 2025. The idea is to consciously encourage a range of perspectives and create a respectful working environment that is conducive to good mental health and in which people are free to express different views and opinions, always with the goal of reaching the best possible decisions.

In order to embed DEI at Heraeus over the long term, the leadership teams will drive forward the topic across the business and incorporate it into their strategy. Because of how important senior managers are in shaping the corporate culture, all will receive appropriate training.

In addition, all units conduct annual staff surveys that contain questions on engagement, diversity, equity, and inclusion. The results can then be used by these businesses to identify specific areas requiring attention and to track

progress. They can also be used to set targets for subsequent years and to determine where action needs to be taken to achieve these.

DEI aspects also feature in our Code of Conduct and in our human rights policy.

All this together is how Heraeus will progressively establish a corporate culture that is based on diversity, equity, and inclusion.

Outlook

Heraeus expects its sales markets to recover in 2024, although geopolitical and macroeconomic factors will give rise to significant uncertainty.

The latest forecast published by the International Monetary Fund (IMF) predicts that global economic growth, which was estimated at 3.1 percent in 2023, will remain at 3.1 percent in 2024. Geopolitical factors will continue to influence economic growth in 2024 in addition to general macroeconomic factors such as changes in the level of inflation and interest rates. The IMF forecasts that growth in the US and China will slow. Growth of 4.6 percent is expected for China (2023: 5.2 percent). For the US, the IMF projects growth of 2.1 percent for 2024 (2023: 2.5 percent). The world's biggest economy is thus predicted to again fare better than the eurozone, which is expected to see growth of 0.9 percent (2023: 0.5 percent). The IMF believes that Germany's economy will expand by 0.5 percent (2023: contraction of 0.3 percent). The economies of emerging markets and developing countries are forecast to grow by 4.1 percent on average (2023: 4.1 percent).

The current growth forecasts continue to be subject to considerable uncertainty. Growth and demand in 2024 may still be very sensitive to negative impacts from sustained high inflation around the world. Moreover, further geopolitical tension could lead to significant volatility in the prices of raw materials. And if the real estate crisis in China were to worsen, that might also have an impact on the global economy.

Heraeus expects revenue excluding precious metals to increase slightly in 2024. However, growth in this key figure is expected to be significant once it has been adjusted for effects related to the sale of the sensors and specialty light sources businesses.

Heraeus is anticipating a slight increase in revenue for its Business Platform **Metals & Recycling** in 2024 following the slight increase recorded in 2023. The trend toward lower prices in the platinum group metals segment is expected to continue. On the other hand, demand in the product businesses is forecast to remain strong. However, there is still a high risk of unexpected supply shortages of raw materials. As well as cost pressures, Heraeus will also feel the impact of increasingly stringent ESG and sustainability standards.

In the Business Platform **Healthcare**, Heraeus is anticipating a slight increase in revenue in 2024 following considerable revenue growth in 2023. The market is expected to continue growing, albeit it at a slower pace than in 2023 because of decreased demand caused by customers using up the surplus inventory they had built up during the pandemic.

Heraeus intends to further strengthen its market position and reap rewards from new product launches.

Heraeus is projecting revenue in its Business Platform **Semiconductor & Electronics** to increase sharply following a decline in 2023. The recovery of the semiconductor market, the resulting resurgence of the spare-parts business, and strong growth in key technologies such as EUV lithography for the semiconductor industry will all contribute to revenue growth. Rising demand for electric vehicles and new energy sources is also expected to play a major role. In the business involving optical fibers for telecommunications, demand is forecast to pick up in the second half of the year once customers have depleted their substantial inventories of glass, optical fibers, and optical cables. The lower price level will have an adverse impact on the size of the market.

In the Business Platform **Industrials**, future business performance is primarily determined by global steel production. The World Steel Association (WSA) predicts that demand for steel will increase by a modest 1.9 percent in 2024. Heraeus expects that the high demand for process control solutions in steel production will also drive up demand for its products, subject to the usual regional variance. However, steel production may be adversely affected by the prevailing geopolitical and inflationary challenges as well as by energy and commodity prices. Demand in the silver conductive pastes business is expected to grow in 2024.

Heraeus is expecting EBITDA, EBIT, EBT, and profit after taxes to fall strongly in 2024 compared with 2023. This forecast is primarily based on the assumption of lower prices in the business with platinum group metals, a further normalization of the precious metal markets, and the absence of income received from sales of business units.

Opportunity and risk report

Integrated risk management system

Heraeus operates a Group-wide system of risk management that is used to systematically document and assess risks. The aim is to identify risks at an early stage and to initiate corrective action as appropriate. The material opportunities and risks identified are explained below.

Identified Group-wide material opportunities and risks

The opportunities and risks outlined below are categorized as low, medium, or high based on their potential impact before risk mitigation measures. Due to possible misinterpretation, no further quantifying information is provided. The risks described relate to the period covered by the outlook. There has been no significant change to the risks compared with the prior year.

Strategic opportunities and risks

Through its portfolio of businesses, Heraeus operates in virtually all global markets. Most of these markets are subject to rapid technological change. Heraeus manages to stand out from its competitors and offer its customers added value in these markets on the basis of its innovative capabilities. The company maintains close ongoing relationships with academics and researchers in order to build and maintain these innovative capabilities, both now and in the future. These relationships also enable Heraeus to identify and make the most of future strategic opportunities.

The Heraeus Accelerator Program, which was initiated in 2019, plays a key role in the sharing of knowledge and experience with start-ups. In 2023, the first Heraeus Precious Metals Accelerator Program took place, focusing on hydrogen technologies as a key element of decarbonization. The R&D activities within the various Business Platforms also lay the foundations for the identification of medium to long-term growth potential. Heraeus is increasingly focusing on innovative forms of research collaboration, such as partnerships and corporate venturing, that complement its organic activities so that it can benefit from new developments at an early stage.

Potentially incorrect assessments of customer demand and resulting errors in the product and technology roadmap are a source of strategic risk for Heraeus. This includes, in particular, risks arising from market trends or (most importantly) disruptive technologies being identified too late or not at all. The Board of Managing Directors of Heraeus Holding and the relevant bodies within the Business Platforms watch the market closely and regularly monitor the

business performance from a strategic perspective in order to limit these risks.

Strategic risks for Heraeus are regarded as low overall.

Market opportunities and risks

High interest rates and further high inflation had a negative impact on the economic situation in 2023 even as the global economy gradually recovered from the challenges it had faced previously due to the worldwide coronavirus pandemic and to Russia's invasion of Ukraine and the subsequent energy crisis in Europe.

Heraeus saw its revenue and profit decline overall in 2023. Weaker demand, especially in the electronics and semiconductor industries, was a key factor in this decline. The biomaterials and medical components businesses again benefited from global market growth linked to the post-pandemic recovery.

Heraeus closely monitors economic trends in individual countries and regions in order to be able to react to any negative developments as early as possible. Developments in Europe, China, and the US are of particular interest to Heraeus. The company benefits in this regard from its global market presence, which helps it to mitigate the impact of regional crises. Economic risk and its effects on business performance constitute a medium risk for the Group due to the influence of high inflation and significant geopolitical risks.

Heraeus counters threats to its market positions and competitive advantages through its broadly diversified product and customer structures, which help to limit its exposure to individual market risks. In addition, the constant refinement of Heraeus products helps to consolidate the Group's long-term competitive edge. Heraeus also minimizes any risks of this nature by building close relationships with customers, steadily adding new big-ticket accounts, and finding and validating additional suppliers for key products. Markets are monitored in detail in each of the Business Platforms and alternative products are developed to counter the potential loss of market shares.

For the Business Platform Metals & Recycling, sustainability related topics require new investments. This presents Heraeus, as a supplier that adheres to high standards, with opportunities in various end markets.

Additional sales opportunities may arise in the fast-growing hydrogen market. However, there is a possibility that the Business Platform will be negatively affected by a fall in

precious metal prices, a decline in volatility in precious metal markets, and the general economic trend.

Opportunities for the Business Platform Healthcare arise from new technologies and new product launches. In addition, Heraeus expects that the new Medical Device Regulation (MDR) introduced by the EU in May 2021 will trigger a further consolidation of providers in this market.

Increased demand for innovative fibers is a source of opportunity for the Business Platform Semiconductor & Electronics. A more rapid and widespread switch to electric vehicles and growing demand for semiconductors would also boost demand for the Business Platform's products. By contrast, high inventories, high inflation, and economic downturns in the markets could lead to falling demand.

In the Industrials Business Platform, future business performance is primarily determined by global steel production. The World Steel Association (WSA) predicts that this will grow by a modest 2 percent in 2024. However, there is a possibility that demand for Heraeus' products will fall because of rising material and energy costs and geopolitical developments.

Market risks for Heraeus are regarded as medium overall.

Operational opportunities and risks

Avoiding production risks is a key task for Heraeus as a technology company with a broad product portfolio and a large number of sites. Weaknesses in the production process could lead to deliveries being cancelled or delayed, which in turn is associated with the additional risk of contractual penalties. To minimize the impact of disruption to production processes, Heraeus has introduced a business continuity management policy and conducts routine maintenance and servicing of its equipment. Critical production processes are also safeguarded by building a degree of redundancy into the system and holding sufficient back-up inventories.

Several risks result from the global procurement process. Fluctuations in the quality of deliveries can lead to substantial risks for Heraeus. Particularly in the medical solutions market, the delivery of base materials and preliminary products, reliably and free of all defects, is very important. Delayed deliveries or disruptions to supply from a supplier could also lead to production bottlenecks or even production downtime. Heraeus mitigates this risk by constantly finding and validating alternative suppliers for key products. Contractual provisions committing suppliers to maintain certain quality and delivery standards and to keep back-up inventories also help to contain risks. This is supported by the global Heraeus purchasing policy, which sets out standardized processes for the procurement of materials, goods, and services from third parties.

In addition to the above, deficiencies in manufacturing processes and resulting defects in product quality represent a risk for Heraeus. Product quality defects could cause reputational damage, cost-intensive rework, product recalls, and, in the worst-case scenario, product liability cases. The most significant risks in this regard are product liability cases involving medical devices and product recalls at automotive suppliers. These risks are mitigated by quality controls and by making continual improvements to the quality management systems. In addition, all businesses are supported by excellence initiatives aimed at achieving maximum product quality.

The growing interconnectedness of the world has increased the threat posed by cyberattacks and the potential misuse of IT systems. Downtime of key IT systems, the disclosure or loss of integrity of confidential data from research and business operations, and the manipulation of IT systems in process management are particularly relevant risks for Heraeus. Heraeus combats these risks using the latest protection software, network and data encryption, and clear authorization processes specified by the Information Security Management System (ISMS), which is based on the ISO 27001 international standard.

Overall, Heraeus classifies the level of exposure to operational risks as medium.

Operational opportunities are currently available in the form of further efficiency improvements in production processes and an associated reduction of unit costs.

Financial opportunities and risks

As a company with international operations, Heraeus is exposed to a range of financial risks. These include interest-rate risk, currency risk, credit risk, and liquidity risk.

Processes are in place within Corporate Treasury to identify, quantify, analyze, manage, and monitor these risks, backed up by relevant policies and internal monitoring and control systems.

Interest-rate risk is the risk of changes in interest rates adversely impacting the financial position or financial performance of the Heraeus Group. The Group's main sources of long-term funding are currently one standard bond and two privately placed registered bonds. Interest-rate derivatives can be used to support interest-rate management. The derivatives that are used can be standard market instruments, such as interest-rate swaps and options for placing upper and lower limits on interest rates (caps, floors, and collars).

Because of its international focus, the Heraeus Group is exposed to currency risk, which arises from movements in the exchange rates of various foreign currencies. Currency risk on transactions is mitigated by means of globally

diversified procurement, production, and sales activities. Hedges may only be entered into with selected counterparties and only within specified limits. Currency translation risks are not hedged.

Credit risk arising from financial assets consists of the risk that counterparties will default. The credit risk relating to derivatives is their replacement cost (market value). The risk of specific counterparties defaulting is constantly monitored using credit spreads and by grouping counterparties into different categories according to their credit quality. Valuation allowances are recognized to reflect the risk of defaults. Financial transactions are only concluded with counterparties of good credit standing. A standardized global system of receivables management based on a limit system is one of the ways in which Heraeus mitigates credit risk. This is the responsibility of the operating units and is monitored and managed by a central credit management unit. Heraeus can make use of various liquidity safeguarding measures to enable it to respond to short-term as well as unexpected liquidity risk. A sufficient level of cash and cash equivalents as well as agreed lines of credit are among the means it has at its disposal for this purpose.

Liquidity risk describes the risk that a company might be unable to meet its financial obligations in full. Liquidity risk largely results from short-term trade payables, liabilities from derivatives, and other financial liabilities. As a result of its investment-grade rating, confirmed by two independent rating agencies, the Heraeus Group is guaranteed sufficient liquidity. Its rating ensures that it can access both the short-term commercial-paper market and the long-term capital market. It also holds sufficient cash and cash equivalents and has unutilized loan facilities with various banks. Risk concentrations are minimized by limiting the amounts invested at individual, selected investment-grade banks. The risk of liquidity shortages is monitored by Corporate Treasury. Effective cash management and the ability to access sufficient liquidity even in times of crisis minimize the risk of the Heraeus Group being unable to meet its financial obligations.

The potential impact of financial risks is regarded as low overall.

Legal opportunities and risks

Environmental protection and health and safety at work remain key priorities for the company. Regular campaigns and intensive communications by the global Environment, Health and Safety (EHS) organization help to raise awareness of occupational health and safety throughout the company. Increasingly strict environmental requirements mean there are occasional risks to the unrestricted continued operation of production facilities. In addition, growing discrepancies between the legal frameworks governing chemicals in different countries are creating increased demand for advisory services. Overall, the

endangerment of employees or third parties and potential breaches of environmental regulations or of chemicals legislation represent a low source of risk for Heraeus.

It is impossible to completely rule out the possibility of non-compliance with financial and accounting regulations due to the global business activities and the different legal environments in which the company operates. This can also result in customs and tax risks. Heraeus reduces these risks by strictly adhering to central governance policies and continually training staff in the relevant functions. It also operates a central compliance management system in order to further reduce the likelihood of legal infractions or violations of the law.

In addition, Heraeus mitigates the risk of fines resulting from potential data protection violations by providing ongoing comprehensive training to make all employees aware of these issues and highlight potential problems. This training is complemented by Group guidelines and policies and the establishment of relevant corporate functions. The use of a largely uniform enterprise resource planning (ERP) system also helps to lower risk by fully integrating and harmonizing relevant business processes. Heraeus considers the overall level of risk to be low.

The growing complexity and number of industrial property rights that need to be observed has increased the risk of possible patent infringements. Heraeus reduces these risks by continually monitoring third-party rights and conducting project-specific searches for patents. The results of this monitoring are subject to regular review, with the search profiles changed as appropriate. Despite the measures put in place, infringements of industrial or intellectual property rights can still occur. Risks from patent infringements are regarded as being low at the current time.

Legal frameworks can also give rise to identifiable opportunities. Heraeus offers a range of products that help customers to meet the requirements of heightened regulations, for example with regard to the transition to electricity produced using renewable sources.

External opportunities and risks

Numerous risks are beyond the control of Heraeus. These primarily include force majeure events that might cause damage to German and international locations and risks resulting from country-specific sociocultural and political developments. The possibility of such risks arising as a result of Russia's invasion of Ukraine cannot be ruled out. Heraeus reduces these risks by implementing a rigorous system of business continuity management and through global diversification of its production sites. The risk of damage to the company's sites is mitigated by taking out insurance. External risks may also arise as a result of restrictions to production, supply chain disruption, or supply shortages.

Reputational risk, which can lead to financial losses and also influence other risk categories, is another potential source of negative effects. Based on the measures put in place and the current situation, Heraeus classifies aggregate external risk as low.

Precious metal trading opportunities and risks

Precious metal trading risks encompass only the risks that arise in connection with business processes involving the trading of precious metals.

The trading companies in Hanau, New York, Hong Kong, and Shanghai conduct precious metal transactions in order to hedge precious metal risks for the producing Group entities. They also enter into precious metal trades with external partners. Positions can only be accumulated and held on a daily basis within tightly defined and continuously monitored risk limits. All transactions are recorded and monitored on an ongoing basis in an electronic trading system. All the trading sites use a standardized IT system, which increases transparency and reduces the trading process risks.

Price risks arise from potential changes in the market prices of precious metals, which could lead to higher finance costs, a sharp fall in metal volumes, and a reluctance among customers to purchase metals or have them supplied. Commonly used hedging instruments are employed to hedge price risks. These are mainly precious metal leases, cash-and-carry transactions (precious metal swaps), forwards, and futures. In accordance with the principle of separation of functions, the ongoing monitoring of compliance with prescribed risk limits and thresholds is carried out by employees who do not report to the trading units.

Heraeus regards precious metal trading risks as being low overall.

The continuing high level of price volatility in the precious metals markets and a possible increase in demand both from investors in precious metals and from industrial customers are potential sources of opportunity in the precious metal trading business.

Overall risk evaluation

With systems in place for the measurement and limitation of risk, Heraeus is also able to meet the need for early risk detection. Based on an analysis of currently identifiable risks, there are no threats to the continued existence of the Heraeus Group as a going concern.

Compliance report*

The content and structure of the Heraeus compliance system has been continually updated since the introduction of a global Code of Conduct for the Heraeus Group on January 1, 2007. The compliance system has been part of the responsibility management system since 2016. The responsibility office is in charge of compliance and data protection structures and helps to establish and anchor reliable and efficient processes and structures around the world related to the exercise of responsibility.

In 2023, Compliance focused on implementation of the German Supply Chain Due Diligence Act (LkSG) and the German Whistleblower Protection Act (HinSchG). A project was also started to update the Heraeus Code of Conduct. To facilitate the implementation of the LkSG, a related declaration of principles was published and processes were created and put into place – with training provided as appropriate – in order to analyze risk and monitor proper application of the Act in Heraeus' own business and in its supply chain. In addition, employees and third parties now have access to a web-based compliance and ethics hotline that provides a much simpler means of reporting suspicions than the previous compliance and ethics hotline.

In regard to the 'Schrems II' decision of the European Court of Justice, the two prior years had been focused on implementation of the decision, whereas the emphasis in 2023 was on further raising awareness of data protection and on reviewing and adapting existing erasure systems. A Data Protection Day was organized for Heraeus Germany in June 2023 at which new developments in data privacy and their impact on Heraeus were presented and discussed. In addition, workshops were held to provide business-unit-specific training on data protection. The various target groups for the workshops included HR managers, works council members, and marketing employees.

With regard to export controls and customs, the now stricter embargoes imposed by the US and the EU in response to Russia's invasion of Ukraine continued to pose a particular challenge. As in the previous year, progress was made with automation with the aim of achieving greater efficiency and better control, and of optimizing the flow of goods.

For EHS, the main focus in 2023 was on further developments to the EHS framework. In addition, ever more demanding statutory and customer requirements and growing discrepancies between the legal frameworks governing chemicals in different countries created increased demand for advisory services. The topic of sustainability, in

particular, took up much more of the agenda in advisory discussions than in previous years.

Global training is provided to ensure that all relevant employees have been informed about new regulations and that they know and understand the rules of the Heraeus compliance system. Furthermore, the Heraeus Compliance Officer and the compliance officers in the operating units regularly share information on compliance matters.

Once per year, at a meeting of the Group Responsibility Committee, whose members include the CEO, the Group General Counsel, the head of the responsibility office, and the heads of key corporate functions, the heads of all businesses are updated by the heads of the key corporate functions on the latest news and developments in relation to compliance, taking account of the Group's legal structures. The auditors also attend this meeting once per year and are informed of the latest news and developments by the heads of the key corporate functions.

The Group companies complete an annual compliance questionnaire on the introduction and implementation of compliance guidelines. The completed questionnaires are one of the components used to review the effectiveness of the compliance system.

As well as submitting reports to the Group Responsibility Committee, the Heraeus Compliance Officer formally reports to the CEO once a year.

Based on all the aggregate findings, the Heraeus Compliance Officer and the Group's Board of Managing Directors inform the Supervisory Board's Audit Committee about developments and progress in the compliance management system, as well as about important individual events.

* This section is not included in the auditor's content review.

Events after the reporting period

There were no significant events after the reporting period.

Consolidated financial statements. Total assets increased to €7.3 billion as of the end of 2023. Revenue excluding precious metals was down slightly at €2.9 billion. Profit after taxes, which had reached a new record high in 2022, fell to €444.2 million. Earnings before interest and tax (EBIT) decreased to €619.8 million. As of December 31, 2023, Heraeus had 15,170 employees worldwide.

Consolidated balance sheet

of Heraeus Holding GmbH, Hanau, for the year ended December 31, 2023

€ million	Note	Dec. 31, 2023	Dec. 31, 2022*	Jan. 1, 2022*
Goodwill	(10)	482.8	527.4	500.4
Other intangible assets	(10)	454.3	519.4	535.0
Property, plant, and equipment	(11)	1,786.7	1,608.7	1,517.9
Investments accounted for using the equity method	(12)	290.0	256.2	244.5
Other financial assets	(13)	89.0	89.0	45.7
Deferred tax assets	(33)	127.4	116.8	177.3
Other assets	(14)	13.1	9.7	2.7
Non-current assets		3,243.3	3,127.2	3,023.5
Precious metals	(15)	958.8	1,170.3	1,253.6
Inventories – excluding precious metals	(15)	704.6	662.7	566.1
Trade receivables	(16)	736.6	759.8	850.6
Time deposits	(17)	128.0	–	–
Cash and cash equivalents	(17)	1,108.0	934.5	649.9
Other financial assets	(13)	223.9	173.9	381.8
Income tax assets		29.5	26.8	69.4
Other assets	(14)	185.0	219.2	213.4
Assets held for sale	(9)	–	77.8	–
Current assets		4,074.4	4,025.0	3,984.8
Assets		7,317.7	7,152.2	7,008.3

* Prior-year figures restated, see (2)

€ million	Note	Dec. 31, 2023	Dec. 31, 2022*	Jan. 1, 2022*
Subscribed capital		210.0	210.0	210.0
Capital reserve		127.8	127.8	127.8
Retained earnings		4,216.5	3,922.8	3,304.2
Other reserves		113.2	248.6	140.6
Treasury shares		- 6.7	- 7.7	- 8.2
Equity attributable to the shareholders of Heraeus Holding GmbH	(18)	4,660.8	4,501.5	3,774.4
Non-controlling interests	(19)	20.2	39.7	30.5
Shareholders' equity		4,681.0	4,541.2	3,804.9
Pensions and similar obligations	(21)	347.5	325.8	566.0
Provisions	(22)	43.3	45.1	46.0
Financial debt	(23)	689.8	674.0	182.7
Other financial liabilities	(24)	7.5	14.2	11.0
Deferred tax liabilities	(33)	155.4	138.1	107.8
Other liabilities	(25)	10.2	13.8	15.2
Non-current liabilities		1,253.7	1,211.0	928.7
Provisions	(22)	149.1	176.6	156.3
Financial debt	(23)	165.9	65.4	597.5
Trade payables	(26)	393.5	493.4	400.5
Other financial liabilities	(24)	317.0	260.5	606.6
Income tax liabilities		50.8	41.6	27.3
Other liabilities	(25)	306.7	340.0	486.5
Liabilities directly associated with assets held for sale	(9)	-	22.5	-
Current liabilities		1,383.0	1,400.0	2,274.7
Shareholders' equity and liabilities		7,317.7	7,152.2	7,008.3

* Prior-year figures restated, see (2)

Consolidated income statement

of Heraeus Holding GmbH, Hanau, for the period January 1 to December 31, 2023

€ million	Note	2023	2022*
Revenue	(27)	25,649.2	29,082.2
Change in inventories		55.7	30.9
Cost of materials		- 23,380.5	- 26,802.1
Personnel expenses	(28)	- 1,129.2	- 1,098.4
Amortization, depreciation, and impairment	(29)	- 225.7	- 261.2
Other operating income	(30)	161.1	209.8
Other operating expenses	(31)	- 537.5	- 518.7
Impairment gains (+) / losses (-) on trade receivables	(16)	- 1.5	- 4.5
Income from investments accounted for using the equity method	(12)	28.2	57.2
Earnings before interest and tax (EBIT)		619.8	695.2
Finance income	(32)	40.8	46.2
Finance costs	(32)	- 65.2	- 57.0
Net finance costs		- 24.4	- 10.8
Profit before taxes		595.4	684.4
Income taxes	(33)	- 151.2	- 179.8
Profit after taxes		444.2	504.6
<i>thereof attributable to the shareholders of Heraeus Holding GmbH</i>		<i>436.0</i>	<i>494.2</i>
<i>thereof attributable to non-controlling interests</i>	(19)	<i>8.2</i>	<i>10.4</i>

* Prior-year figures restated, see (2)

Consolidated statement of comprehensive income

of Heraeus Holding GmbH, Hanau, for the period January 1 to December 31, 2023

€ million	Note	2023			2022*		
		Amount before taxes	Tax expense / income	Amount after taxes	Amount before taxes	Tax expense / income	Amount after taxes
Profit		595.4	- 151.2	444.2	684.4	- 179.8	504.6
Items that will not be reclassified to profit or loss							
Remeasurement of net liability arising from defined benefit pension plans	(21)	- 51.9	9.7	- 42.2	223.5	- 54.0	169.5
Items that have been or can be reclassified to profit or loss							
Currency translation adjustment		- 93.2	-	- 93.2	91.4	-	91.4
Currency translation adjustment reclassified to profit or loss		- 26.5	-	- 26.5	-	-	-
Share of other comprehensive income of investments accounted for using the equity method		- 14.6	-	- 14.6	- 9.8	-	- 9.8
Effective portion of changes in fair value of cash flow hedges	(39a)	2.2	- 0.6	1.6	32.5	- 9.5	23.0
Cash flow hedges reclassified to profit or loss	(39a)	- 6.7	2.0	- 4.7	3.2	- 1.0	2.2
Equity instruments measured at fair value		- 0.3	-	- 0.3	-	-	-
Other comprehensive income		- 191.0	11.1	- 179.9	340.8	- 64.5	276.3
Total comprehensive income		404.4	- 140.1	264.3	1,025.2	- 244.3	780.9
<i>thereof attributable to the shareholders of Heraeus Holding GmbH</i>				<i>257.7</i>			<i>771.7</i>
<i>thereof attributable to non-controlling interests</i>				<i>6.6</i>			<i>9.2</i>

* Prior-year figures restated, see (2)

Consolidated cash flow statement

of Heraeus Holding GmbH, Hanau, for the period January 1 to December 31, 2023

€ million	Note	2023	2022*
Profit after taxes		444.2	504.6
Amortization, depreciation, impairment, and reversal of impairment of non-current assets	(10) (11)	225.7	250.3
Net finance costs	(32)	24.4	10.8
Distributions received from associates and joint ventures		21.5	50.3
Change in inventories		100.9	- 25.8
Change in trade receivables		- 17.1	79.0
Change in trade payables		- 85.0	89.1
Change in provisions and in pensions and similar obligations		- 47.3	- 4.1
Change in other net assets		105.0	- 311.9
Other non-cash transactions and other non-operating expenses and income		- 142.3	47.5
Gains on disposal of property, plant, and equipment		3.5	2.3
Net cash provided by operating activities	(34)	633.5	692.1
Proceeds from the disposal of non-current assets		0.5	2.5
Payments for investments in non-current assets		- 359.6	- 305.5
Proceeds from the disposal of Operating Companies		189.4	-
Payments for acquisitions minus acquired liquid funds		- 32.4	- 9.0
Payments for the acquisition of entities accounted for using the equity method		- 34.7	- 13.9
Proceeds from the disposal of other investments		3.8	33.7
Payments for the acquisition of other investments		- 14.4	- 0.5
Payments for the acquisition of other financial assets		- 36.6	- 2.0
Other cash proceeds		0.4	6.0
Other cash payments		- 0.2	-
Interest received		35.9	26.9
Payments for the acquisition of time deposits		- 128.0	-
Net cash used for investing activities	(35)	- 375.9	- 261.8
Proceeds from disposal of treasury shares		1.0	0.5
Distributions, including distributions to non-controlling interests		- 112.0	- 45.1
Payments for the acquisition of non-controlling interests		- 20.7	-
Interest paid		- 49.2	- 49.8
Proceeds from the issuing of interest-bearing liabilities		132.3	499.6
Payments relating to the redemption of interest-bearing liabilities		- 30.1	- 546.0
Net cash used for financing activities	(36)	- 78.7	- 140.8
Net change in cash and cash equivalents		178.9	289.5
Effect of exchange rate differences on cash and cash equivalents		- 7.8	- 2.5
Cash and cash equivalents at the beginning of the period		936.9	649.9
Cash and cash equivalents at the end of the period	(37)	1,108.0	936.9
<i>thereof cash and cash equivalents held for sale</i>		-	- 2.4

* Prior-year figures restated, see (2)

Consolidated statement of changes in shareholders' equity

of Heraeus Holding GmbH, Hanau, for the period January 1 to December 31, 2023

€ million	Note	Subscribed capital	Capital reserve	Retained earnings		Other reserves			Treasury shares	Equity attributable to the shareholders of Heraeus Holding GmbH	Non-controlling interests (19)	Shareholders' equity
				Other retained earnings	Remeasurement of defined benefit pension plans	Currency translation	Cash flow hedges	Fair value measurement of equity instruments				
Shareholders' equity as of Jan. 1, 2022		210.0	127.8	3,516.5	- 216.0	143.6	- 2.8	-	- 8.2	3,770.9	30.5	3,801.4
Change in recognition		-	-	3.7	-	- 0.2	-	-	-	3.5	-	3.5
Shareholders' equity as of Jan. 1, 2022*, adjusted		210.0	127.8	3,520.2	- 216.0	143.4	- 2.8	-	- 8.2	3,774.4	30.5	3,804.9
Profit after taxes, 2022		-	-	494.2	-	-	-	-	-	494.2	10.4	504.6
Remeasurement of defined benefit pension plans	(21)	-	-	-	169.5	-	-	-	-	169.5	-	169.5
Currency translation		-	-	-	-	92.6	-	-	-	92.6	- 1.2	91.4
Share of income from investments accounted for using the equity method		-	-	-	-	- 9.8	-	-	-	- 9.8	-	- 9.8
Cash flow hedges	(39a)	-	-	-	-	-	25.2	-	-	25.2	-	25.2
Other comprehensive income for 2022		-	-	-	169.5	82.8	25.2	-	-	277.5	- 1.2	276.3
Total comprehensive income for 2022		-	-	494.2	169.5	82.8	25.2	-	-	771.7	9.2	780.9
Distributions	(36)	-	-	- 45.1	-	-	-	-	-	- 45.1	-	- 45.1
Disposal of treasury shares		-	-	-	-	-	-	-	0.5	0.5	-	0.5
Shareholders' equity as of Dec. 31, 2022*		210.0	127.8	3,969.3	- 46.5	226.2	22.4	-	- 7.7	4,501.5	39.7	4,541.2
Shareholders' equity as of Jan. 1, 2023		210.0	127.8	3,969.3	- 46.5	226.2	22.4	-	- 7.7	4,501.5	39.7	4,541.2
Profit after taxes, 2023		-	-	436.0	-	-	-	-	-	436.0	8.2	444.2
Remeasurement of defined benefit pension plans	(21)	-	-	-	- 42.2	-	-	-	-	- 42.2	-	- 42.2
Currency translation		-	-	-	-	- 118.1	-	-	-	- 118.1	- 1.6	- 119.7
Share of income from investments accounted for using the equity method		-	-	-	-	- 14.6	-	-	-	- 14.6	-	- 14.6
Cash flow hedges	(39a)	-	-	-	-	-	- 3.1	-	-	- 3.1	-	- 3.1
Fair value measurement of equity instruments		-	-	-	-	-	-	- 0.3	-	- 0.3	-	- 0.3
Other comprehensive income for 2023		-	-	-	- 42.2	- 132.7	- 3.1	- 0.3	-	- 178.3	- 1.6	- 179.9
Total comprehensive income for 2023		-	-	436.0	- 42.2	- 132.7	- 3.1	- 0.3	-	257.7	6.6	264.3
Distributions	(36)	-	-	- 99.6	-	-	-	-	-	- 99.6	- 12.4	- 112.0
Acquisition of non-controlling interests		-	-	- 0.5	-	0.7	-	-	-	0.2	- 13.7	- 13.5
Disposal of treasury shares		-	-	-	-	-	-	-	1.0	1.0	-	1.0
Disposals	(9)	-	-	- 8.3	8.3	-	-	-	-	-	-	-
Shareholders' equity as of Dec. 31, 2023		210.0	127.8	4,296.9	- 80.4	94.2	19.3	- 0.3	- 6.7	4,660.8	20.2	4,681.0

* Prior-year figures restated, see (2)

Notes to the consolidated financial statements

of Heraeus Holding GmbH, Hanau, for the year ended December 31, 2023

Significant accounting policies

(1) General disclosures

Heraeus Holding GmbH is the Group's parent company and its headquarters are at Heraeusstrasse 12–14, 63450 Hanau, Germany. The company is registered in the commercial register of the Hanau local court under the number HRB 3364. Heraeus Holding GmbH is a family-owned global technology company that, on the basis of its range of products, is one of the leading providers in each of its global sales markets. These include the markets for electronics, medical equipment, semiconductors, telecommunications, lighting, chemicals, pharmaceuticals, steel, photovoltaics, and automotive products.

Applying section 315e of the German Commercial Code (HGB), the consolidated financial statements of Heraeus Holding GmbH have been prepared in accordance with International Financial Reporting Standards (IFRS) as adopted by the European Union (EU). All of the IFRSs, International Accounting Standards (IAS), and interpretations of the IFRS Interpretations Committee (IFRS IC) that were required to be applied in the 2023 financial year were followed. In addition to the IFRS requirements, all statutory disclosure and explanation requirements in the HGB were met.

The financial year of Heraeus Holding GmbH began on January 1, 2023 and ended on December 31, 2023. The corresponding prior-year period was January 1, 2022 to December 31, 2022. The consolidated financial statements have been prepared in euros. Unless otherwise stated, all amounts are shown in millions of euros (€ million).

To improve the clarity of presentation and the transparency of the consolidated financial statements, some items on the consolidated balance sheet and in the consolidated income statement have been aggregated and are reported separately in the notes to the consolidated financial statements. The consolidated income statement has been prepared using the nature-of-expense method. The assets and liabilities on the consolidated balance sheet are broken down into current and non-current items. Assets and liabilities are considered to be current if they fall due or are intended to be sold within one year or within the entity's normal operating cycle. This period begins with the procurement of the resources needed for the production process and ends with the receipt of cash or cash equivalents in return for the sale of the products created or services provided in this process. Trade receivables, trade payables, and inventories are reported as current items. Deferred tax assets, deferred tax liabilities, and pensions and similar obligations are reported as non-current items.

The consolidated financial statements are generally prepared using the cost method, with the exception of derivative financial instruments, investments, and certain other financial assets and liabilities, which are measured at fair value.

On March 6, 2024, the consolidated financial statements of Heraeus Holding GmbH for the financial year from January 1, 2023 to December 31, 2023 were released for publication by the Board of Managing Directors.

(2) Amendments to accounting policies

(a) Initial application of new standards and interpretations

Amendments to standards that are of relevance to Heraeus and were applied for the first time in the reporting year are explained below.

IFRS 17 – 'Insurance Contracts'

IFRS 17 supersedes IFRS 4 and establishes for the first time standardized principles for the recognition, measurement, presentation, and disclosure in the notes of insurance contracts, reinsurance treaties, and investment contracts with discretionary participation features. Under the IFRS 17 measurement model, groups of insurance contracts are measured on the basis of the expected value of discounted cash flows, including an explicit risk adjustment for non-financial risk and a contractual service margin that will lead to a profit that the entity will recognize as it provides services under the insurance contracts in the group.

There was no impact on the consolidated financial statements of Heraeus Holding GmbH.

Amendments to IAS 1 and IFRS Practice Statement 2 – ‘Disclosure of Accounting Policies’

The amendment to IAS 1 stipulates that only ‘material’ accounting policies should be disclosed in the notes. To be classed as material, the accounting policy must relate to material transactions or other events and there must be a reason for its disclosure. Examples of such reasons are that the policy has changed, that the policy was chosen from a range of options, that the policy is complex or requires the entity to make significant accounting estimates, or that the policy was developed in accordance with IAS 8.10-11. Accordingly, the amendments to Practice Statement 2 show how the concept of materiality is to be applied to the disclosure of accounting policies. In the future, the focus should be on entity-specific information rather than on standardized information.

There was no material impact on the consolidated financial statements of Heraeus Holding GmbH.

Amendments to IAS 8 – ‘Definition of Accounting Estimates’

The amendment to IAS 8 clarifies how entities can distinguish more clearly between accounting policy changes and accounting estimate changes. To this end, it specifies that an accounting estimate always relates to a monetary amount in the financial statements that is subject to measurement uncertainty. To calculate an accounting estimate, an entity uses not only inputs but also measurement methods. Measurement methods can be estimation methods or measurement techniques.

There was no material impact on the consolidated financial statements of Heraeus Holding GmbH.

Amendments to IAS 12 – ‘Deferred Tax related to Assets and Liabilities arising from a Single Transaction’

The amendments address previous uncertainties about how to account for deferred taxes in relation to leases, disposal obligations, and restoration obligations.

When assets and liabilities are recognized for the first time, an initial recognition exemption applies provided that certain requirements are met (IAS 12.15). As an exception in such cases, deferred taxes do not have to be recognized. In practice, however, there was uncertainty about whether this exemption also applied to leases, disposal obligations, and restoration obligations. A narrow-scope amendment to IAS 12 has now been made in order to ensure that the standard is applied consistently.

As a result of this amendment, the initial recognition exemption no longer applies to transactions that, on initial recognition, give rise to equal amounts of deductible and taxable temporary differences, even if the other previously applicable requirements are met. In other words, the initial recognition exemption has been withdrawn for a narrowly defined set of cases. The amendment means that deferred taxes on, for example, leases recognized by a lessee or on disposal obligations or restoration obligations, have to be recognized.

There was no material impact on the consolidated financial statements of Heraeus Holding GmbH.

Amendments to IAS 12 – ‘International Tax Reform – Pillar Two Model Rules’

The amendment introduces a temporary and mandatory exception to the requirement to recognize deferred taxes where they arise as a result of the introduction of the global minimum tax rate. The amendment also specifies disclosure requirements for affected entities that are intended to help users of financial statements understand the degree to which an entity is currently affected or will be affected in future by the minimum tax rate.

There was no material impact on the consolidated financial statements of Heraeus Holding GmbH.

(b) Change in accounting policy

Due to a system migration in the precious metal trading business, trading inventories in 2023 were measured using the first-in-first-out method. Obligations to cover forward purchases are recognized at the market prices as of the balance sheet date. Under the old accounting policy, trading inventories were measured at the contracted cost of purchase and obligations to cover purchases were measured at the contracted settlement amount. Overall, the change in recognition brings the policy closer into line with the mark-to-market method used for internal management purposes and therefore enhances transparency for users of the financial statements. Consequently, forward transactions in precious metals for which the own-use exemption does not apply due to the system migration are measured at fair value. The prior-year figures have been restated accordingly and are shown in the following tables:

Consolidated balance sheet:

€ million	Dec. 31, 2022	Change	Dec. 31, 2022, restated	Jan. 1, 2022	Change	Jan. 1, 2022 restated
Deferred tax assets	116.8	–	116.8	176.6	0.7	177.3
Precious metals	1,162.7	7.6	1,170.3	1,256.0	– 2.4	1,253.6
Other non-current financial assets	158.2	15.7	173.9	365.3	16.5	381.8
Retained earnings	3,913.9	8.9	3,922.8	3,300.5	3.7	3,304.2
Other reserves	248.8	– 0.2	248.6	140.8	– 0.2	140.6
Deferred tax liabilities	134.5	3.6	138.1	105.4	2.4	107.8
Other non-current financial liabilities	249.5	11.0	260.5	598.8	7.8	606.6
Other current liabilities	340.0	–	340.0	485.4	1.1	486.5

Consolidated income statement and consolidated statement of comprehensive income:

€ million	2022	Change	2022, restated
Cost of materials	– 26,810.2	8.1	– 26,802.1
Other operating income	210.9	– 1.1	209.8
Earnings before interest and tax (EBIT)	688.2	7.0	695.2
Profit before taxes	677.4	7.0	684.4
Income taxes	– 178.0	– 1.8	– 179.8
Profit after taxes	499.4	5.2	504.6
<i>thereof attributable to the shareholders of Heraeus Holding GmbH</i>	<i>489.0</i>	<i>5.2</i>	<i>494.2</i>
Total comprehensive income	775.7	5.2	780.9
<i>thereof attributable to the shareholders of Heraeus Holding GmbH</i>	<i>766.5</i>	<i>5.2</i>	<i>771.7</i>

Consolidated cash flow statement:

€ million	2022	Change	2022, restated
Profit after taxes	499.4	5.2	504.6
Change in inventories	– 15.7	– 10.1	– 25.8
Change in other net assets	– 310.8	– 1.1	– 311.9
Other non-cash transactions and other non-operating expenses	41.5	6.0	47.5
Net cash provided by operating activities	692.1	–	692.1

(3) Financial reporting standards not applied early

Heraeus does not plan to apply the following new or amended standards and interpretations before the mandatory application date. Their application is only mandatory in subsequent annual periods. Other new standards, interpretations, and amendments have also been issued, but they are not expected to impact on the consolidated financial statements of Heraeus.

(a) Already endorsed by the EU

Amendments to IFRS 16 – ‘Lease Liability in a Sale and Leaseback’

This amendment relates to the recognition of lease liabilities from sale-and-leaseback transactions and stipulates that, following a sale, the seller-lessee does not recognize in profit or loss any amount that relates to the retained right-of-use asset. The newly added passages describe various possible methods, especially for variable lease payments, using examples for illustration.

The amendments come into force for financial years commencing on or after January 1, 2024. Early application of the amendments is permitted.

The Group currently anticipates that there will be no material impact on the consolidated financial statements.

(b) Not yet endorsed by the EU

Amendments to IAS 7 and IFRS 7 – ‘Supplier Finance Arrangements’

The amendments relate to disclosure rules in connection with supplier finance arrangements – also referred to as supply chain finance, trade payables finance, or reverse factoring arrangements.

The new rules, which supplement the requirements that already feature in other standards, expressly require a company to disclose:

- the terms and conditions of supplier finance arrangements;
- the amount of the liabilities that are part of the arrangements, the amount for which the suppliers have already received payment from the finance providers, and where the liabilities are reported on the balance sheet;
- ranges of payment due dates; and
- information on liquidity risk.

The amendments come into force for reporting periods commencing on or after January 1, 2024, subject to incorporation into EU law. Early adoption is permitted, subject to endorsement by the EU.

The Group currently anticipates that there will be no material impact on the consolidated financial statements.

(4) Principles of consolidation

The financial statements of the consolidated entities have been prepared as of the balance sheet date of the consolidated financial statements in accordance with uniform accounting policies that comply with IFRS.

As part of acquisition accounting, the carrying amounts of equity investments in subsidiaries are offset against the portion of equity held in these subsidiaries. In the case of business combinations, the identified assets and liabilities acquired are recognized at fair value. Certain items, such as deferred taxes and employee benefits, are measured in accordance with the standards pertinent to them. Any excess of the purchase price over the fair value of net assets acquired after allocation of the purchase price is recognized as goodwill. A negative excess is recognized in the income statement in the period in which the acquisition takes place. Non-controlling interests are measured as of their acquisition date and recognized in proportion with the share of the identified net assets of the acquiree that they hold.

Income and expenses arising from intercompany transactions are eliminated in full. Profits and losses from intercompany sales and services are eliminated. Receivables and liabilities within the Group are offset against each other. The income tax implications of consolidation transactions that are recognized in the income statement are taken into account and deferred taxes are recognized.

(5) Currency translation

Separate financial statements prepared in foreign currencies by subsidiaries abroad are translated into euros as the reporting currency. Because subsidiaries conduct their business independently from a financial, commercial, and organizational perspective, their functional currency is generally the same as their local currency. For ten foreign subsidiaries (2022: nine), the functional currency is the US dollar or euro rather than their local currency.

In the consolidated financial statements, income and expenses arising from financial statements prepared in foreign currencies are translated at the average exchange rate for the year, assets and liabilities are translated at the closing rate, and shareholders' equity is translated at historical rates. Any remaining exchange differences are reported in other comprehensive income.

Exchange differences arising from the consolidation of receivables and liabilities are recognized in profit or loss and reported in other operating income or other operating expenses in the consolidated income statement. Foreign-currency receivables and liabilities reported in local subsidiaries' separate financial statements are translated at the closing rate. Unrealized gains and losses on the balance sheet date are recognized in profit or loss.

Exchange rate gains and losses from the translation of operating receivables and liabilities in foreign currency and net gains or losses from the fair value measurement of derivatives used as operating hedges for underlying transactions in foreign currency are reported in other operating income or other operating expenses. Net exchange rate gains or losses in connection with funding are reported in net finance costs.

The table below shows changes in the exchange rates against the euro used to translate major currencies:

	€1 =	Closing rate		Average rate	
		Dec. 31, 2023	Dec. 31, 2022	2023	2022
China	CNY	7.8509	7.3582	7.6600	7.0788
UK	GBP	0.8691	0.8869	0.8698	0.8528
Hong Kong	HKD	8.6314	8.3163	8.4650	8.2451
Japan	JPY	156.33	140.66	151.99	138.03
South Korea	KRW	1,433.66	1,344.09	1,412.88	1,358.07
Switzerland	CHF	0.9260	0.9847	0.9718	1.0047
USA	USD	1.1050	1.0666	1.0813	1.0530

(6) Accounting policies

(a) Goodwill

Capitalized goodwill is tested for impairment on an annual basis or whenever there are indications of impairment. Impairment testing is generally based on value in use. Fair value less costs of disposal is only calculated if the value in use of a cash-generating unit falls below its carrying value and it is possible to make a reliable estimate.

(b) Other intangible assets

Intangible assets that have been purchased are carried at cost and amortized using the straight-line method over their useful life, provided they have a finite useful life. The main intangible assets relate to customer relationships, technologies, and brands stemming from acquisitions. They are predominantly amortized over a period of between seven and 15 years, while a useful life of three to five years is used for software.

When accounting for internally generated intangible assets, a distinction is made between research costs and development costs. Research costs are recognized as expenses in the consolidated income statement as incurred, while development costs for future products or technologies are capitalized, provided they meet all of the relevant criteria on a cumulative basis. If they do not meet the criteria for capitalization, costs are recognized in profit or loss for the year in which they are incurred.

(c) Property, plant, and equipment

Property, plant, and equipment is measured at cost less cumulative depreciation and impairment. Cost comprises the purchase consideration and any directly attributable purchase-related costs incurred to bring an asset into the working condition required for its intended use.

Grants, allowances, and similar government assistance are deducted from cost.

Property, plant, and equipment is depreciated over its useful economic life using the straight-line method. Depreciation is generally based on the following useful lives:

Asset item	Useful life (years)
Buildings	15 – 50
Leasehold improvements	5 – 25
Plant and machinery	10 – 25
Office furniture and equipment	4 – 25

(d) Leases

As a lessee, the Group recognizes assets for the rights to use the leased assets and liabilities for obligations entered into to make payments. The right-of-use assets are recognized at cost initially and then depreciated on a straight-line basis over the term of the lease. The cost of the right-of-use asset is the present value of all future lease payments plus any lease payments made at or before the lease commencement date, the direct costs for performance of the lease, and the estimated costs for dismantling, removing, or restoring the leased asset. Right-of-use assets are recognized under property, plant, and equipment. Lease liabilities are initially recognized at the present value of the outstanding lease payments and subsequently accounted for using the effective interest method. The discount rate applied is generally the lessee's incremental borrowing rate of interest. Lease liabilities are recognized under non-current or current financial debt depending on their residual term.

The recognition exemption is applied for leases where the underlying asset has a low value. The payments under these leases are instead recognized as an expense on a straight-line basis.

(e) Joint ventures and associates

Investments in joint ventures and associates are measured at acquisition cost at the time of initial recognition and then subsequently at the relevant proportion of equity using the equity method. If these entities have different balance sheet dates, interim financial statements are used for them.

(f) Precious metals

For measurement purposes, precious metal inventories are divided into the following categories:

The unhedged precious metal inventory, consisting of precious metals tied up in processing and production processes and precious metals held for strategic reasons, is measured at the lower of weighted average cost and net realizable value. If the reasons for recognizing a write-down cease to exist, it is reversed up to a maximum of original cost.

The inventory held on demand is the stock of precious metals needed to fulfill customer orders. Precious metals for the inventory held on demand are measured at the contractual purchase price agreed for the customer (attributable cost of purchase).

The trading inventory consists of precious metals that are held by the trading companies in the Group. These are measured using the first-in, first-out method. Obligations to cover forward purchases are recognized at the market prices as of the balance sheet date. They are shown under other liabilities.

The inhouse recycling inventory consists of recycling materials containing precious metals that are already in the possession of Heraeus but have not yet been processed. The precious metal purchase prices for these materials have not yet been fixed, so the estimated quantities are measured at the precious metal prices valid as of the balance sheet date. A related liability for outstanding invoices is recognized under trade payables. The final value of the recycling materials is determined after the precious metal purchase prices have been fixed.

(g) Inventories – excluding precious metals

Materials and supplies, commodities, work in progress, and finished goods are measured at the lower of cost and net realizable value. The cost of materials and supplies is generally determined on the basis of weighted average costs; the cost of work in progress and finished goods is, in some cases, also based on standard costs if these are close to the market value. Write-downs of inventories are recognized if the net realizable value is lower than the recognized cost.

(h) Financial instruments

Measurement and classification

Financial instruments include non-derivative financial instruments such as trade receivables, trade payables, financial debt, and other financial assets and liabilities. There are also derivative financial instruments, which are used to hedge currency, price, and interest-rate risk.

The following categories of financial asset are relevant to Heraeus in the context of debt instruments:

- measured at amortized cost,
- measured at fair value through profit or loss.

Classification is based on the business model used to manage debt instruments and on the characteristics of the contractual cash flows.

Debt instruments are measured at amortized cost if they are held as part of a business model aimed at collecting contractual cash flows and the contractual terms give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding.

Debt instruments that are not measured at amortized cost are measured within the Group at fair value through profit or loss.

For equity instruments that are not held for trading purposes and are otherwise measured at fair value through profit or loss, there is an option to recognize the fair value changes in other comprehensive income. In this case, amounts recognized in other comprehensive income cannot be reclassified to profit or loss at a later date. This option is considered on a case-by-case basis for each instrument; the decision on exercising the option is irrevocable.

Financial liabilities are classified into the following categories:

- measured at amortized cost,
- measured at fair value through profit or loss.

Purchases and sales of financial instruments are recognized at their settlement date, while derivatives are recognized at their trade date. Initial measurement is at fair value.

Impairment

Impairment losses are recognized in the amount of the expected credit loss for debt instruments that are measured at amortized cost. At each balance sheet date, they are adjusted to reflect the change in credit risk of the financial instrument in question since initial recognition and are based on the expected credit loss over the subsequent twelve months. If there has been a significant increase in default risk, the credit loss from expected default events during the remaining period to maturity is recognized.

At each balance sheet date, an assessment is carried out to ascertain whether there has been a significant increase in credit risk. The individual credit risk is assessed using quantitative and qualitative information, such as data on credit default swaps, past experience, and assumptions about the future. The latter include industry-specific and country-specific expectations regarding future credit risk.

Indications of a significant increase in credit risk include, among others, the following information and expectations:

- a significant change in the external or internal credit rating of the financial instrument,
- unfavorable changes to the business situation, financial parameters, or economic conditions that have a significant influence on the credit standing of the customer in question,
- evidence that a customer is in significant financial difficulties,
- non-compliance with payment terms.

As in 2022, no material need to recognize impairment losses on credit balances with banks or other debt instruments was identified in 2023.

By contrast, expected credit losses on trade receivables are calculated using a simplified model based on a provision matrix.

Derivative financial instruments

Derivatives are measured at fair value.

Commodity futures to which the own-use exemption pursuant to IFRS 9 does not apply are separated from the own-use portfolio and recognized at fair value as held for trading. Changes in fair value are recognized in profit or loss.

In individual cases, hedge accounting is applied to the hedging of predicted future cash flows in foreign currencies, to the hedging of interest payments, and to the hedging of precious metal price risks (cash flow hedges).

At the inception of hedge accounting, the hedging relationship between the underlying transaction and the hedging instrument is documented, including the risk-management objectives and the corporate strategy behind entering into hedges. A record is also kept of whether the designated hedging instrument is highly effective, in terms of the risk that is being hedged, in compensating for changes in the fair value of the underlying transaction or in the cash flows arising from the underlying transaction. This is carried out when hedges are taken out as well as during their term.

The effective part of changes in the fair value of hedging instruments is recognized in other comprehensive income, taking deferred taxes into account. Only at the time that the corresponding gains or losses on the underlying transaction are realized are the cumulative adjustments to equity recognized in profit or loss.

Trade receivables

Trade receivables are measured at amortized cost. They are generally due within one year, so discounting is not necessary.

A simplified method is used to measure the expected credit loss on trade receivables. Under this method, the impairment loss is calculated using a provision matrix with defined time periods and taking country-specific and industry-specific characteristics into account. The default of credit-impaired trade receivables is examined separately on a case-by-case basis.

Indications that trade receivables may be credit-impaired include, but are not limited to:

- The customer is in significant financial difficulty,
- the contract is breached due to payment becoming past due,
- the customer is faced with the threat of insolvency.

Impairment losses are recognized in profit or loss. If it becomes apparent in subsequent periods that the reasons for recognizing an impairment loss no longer apply, the impairment loss is reversed up to a maximum of the original cost.

Carrying amounts of receivables are adjusted via an allowance account. Receivables that are uncollectible are derecognized by writing them off in full.

The impairment loss, the income from the reversal, and other changes recognized in profit or loss resulting from the adjustment of measurement parameters are presented on a net basis in a separate line in the consolidated income statement.

Time deposits

Time deposits are deposits with a fixed term of between three and twelve months. They are recognized at amortized cost.

Cash and cash equivalents

Cash and cash equivalents are reported at amortized cost. Cash on hand in foreign currency is translated at the closing rate. The money market funds included are not subject to significant fluctuations in value and can be converted to cash within one day.

Financial debt

Financial debt relates to one standard bond, registered bonds, liabilities to banks, and lease liabilities. It is recognized at amortized cost using the effective interest method.

Other financial assets and other financial liabilities

Other financial assets and liabilities are predominantly measured at amortized cost. There is a small volume of equity instruments that, depending on whether the option has been exercised, are measured at fair value through profit or loss or at fair value through other comprehensive income. There are also derivatives that are measured at fair value.

In order to manage precious metal liquidity, Heraeus concludes precious metal swaps with its counterparties. Amounts paid or received in relation to these transactions are reported under Other financial assets or Other financial liabilities.

(i) Pensions and similar obligations

Defined benefit obligations are recognized and measured separately for each defined benefit plan using the projected unit credit method, which takes into account expected increases in salaries and pensions in the future in addition to the pensions and vested pension rights known at the balance sheet date. The actuarial assumptions regarding discount rates, increases in salaries and pensions, staff turnover, and rises in healthcare costs on which the calculation of the defined benefit obligation is based are determined for each country taking into account the economic conditions in each case. The interest rates used to discount defined benefit obligations are based on market yields on high-quality bonds denominated in the same currency and for the same duration as the defined benefit obligations.

If defined benefit obligations are funded by assets held by a legally independent entity that may only be used to meet the pension obligations incurred, and are beyond the reach of any creditors, the assets are deducted from the defined benefit obligations, which are recognized as a net liability. The funds held by the Heraeus Group's German companies and some of its companies abroad qualify as plan assets and are therefore offset against the present value of the defined benefit obligations.

The actuarial gains and losses that arise from changes in the assumptions underlying the calculations, and from variations between those assumptions and actual developments, are recognized in the Group's other comprehensive income in the period that they arise, taking account of deferred taxes. They are shown in a separate reserve within retained earnings. If the defined benefit obligations are sold or redeemed, they are reclassified to other retained earnings.

The expenses for defined contribution plans attributable to each year are recognized directly in personnel expenses in that year.

(j) Provisions

Provisions are recognized when the Group has a current legal or constructive obligation to a third party as the result of a past event, an outflow of resources is probable, and the amount of the obligation can be reliably estimated. Provisions are recognized in the amount of the most likely settlement amount, or if there is a large number of possible scenarios, in the amount of the expected value of the possible settlement amounts. Estimates are reviewed and adjusted periodically.

If the time value of money is material, provisions that will not result in an outflow of resources until after the following year are recognized at the present value of the expenditure estimated to be needed to meet the obligation.

(k) Deferred taxes

Deferred taxes are calculated on the basis of temporary differences between the carrying amounts of assets and liabilities in the IFRS financial statements and the Group's tax accounts, realizable loss carryforwards, and consolidation transactions. They are calculated using the tax rates anticipated in the various countries at the time these items are recognized, based on the legal provisions in force or approved at the balance sheet date.

Deferred taxes based on items recognized in other comprehensive income or in equity are themselves also recognized in other comprehensive income or in equity.

Deferred tax assets are offset against deferred tax liabilities if levied by the same taxation authority and if there is a legally enforceable right to offset current tax assets against current tax liabilities.

Deferred tax assets are recognized if it is likely that future taxable profits will be available against which it will be possible to offset deductible temporary differences, unutilized tax losses, and unutilized tax credits.

(l) Revenue and other income

Revenue is reported in the amount of the consideration that Heraeus expects to receive and recognize when the customer obtains control over the agreed goods and services and can benefit from them. Control may pass at a point in time or over a period of time. The performance obligations arising under contracts with customers of Heraeus are predominantly fulfilled at a point in time.

Revenue is recognized over a period of time only in a small number of cases and to an immaterial extent. As a rule, the period between fulfillment of the performance obligation and payment is not material. The contracts do not typically include a funding component.

The total proceeds from services included in revenue are insignificant. Interest income is recognized pro rata in accordance with the effective interest method; this includes interest for the leasing of precious metals.

Contract assets and contract liabilities may arise and are shown under other assets and other liabilities respectively.

Revenue recognition in the business platforms can be summarized as follows:

Metals & Recycling:

In trading transactions, control routinely passes with effect from the due date. In recycling transactions, the performance obligation is the reimbursement of the customer for the precious metal, which means the charges are recognized as revenue on the day of reimbursement. In product deliveries, the revenue is usually recognized after shipping except where the passing of control takes place at a later point in time.

Healthcare, Semiconductor & Electronics, and Industrials:

Revenue is usually recognized after the product is shipped, except where the passing of control takes place at a later point in time.

(m) Cost of materials

Cost of materials includes the costs of raw materials and supplies, goods, and precious metals.

(n) Impairment of intangible assets and property, plant, and equipment

Intangible assets and property, plant, and equipment are tested for impairment if there are indications of impairment. If the carrying amount is above the recoverable amount, impairment losses are recognized. The recoverable amount is the higher of fair value less costs of disposal and value in use.

If the reasons for recognizing impairment losses cease to apply, impairment losses are reversed. The reversal recognized in profit or loss is limited to the lower of the recoverable amount and the depreciated/amortized carrying amount that would have arisen had no impairment loss been recognized in the past. Goodwill is excluded from the reversal of impairment losses.

Impairment losses and reversals thereof are reviewed at the level of the cash-generating unit unless the recoverable amount can be determined for the individual asset.

(o) Precious metal leases

For the purpose of sourcing precious metals, Heraeus enters into transactions such as precious metal leases as lessee and sometimes as lessor. In a leasing transaction, the lessor transfers to the lessee a contractually determined quantity of a precious metal for a fixed period of time and receives interest in return for transferring the precious metal. The Heraeus Group generally enters into precious metal leases with a maximum term of twelve months. In the case of precious metal leases, it is the lessor that retains legal ownership and price risk as well as the material risks and opportunities. Precious metal leases in which Heraeus is the lessee are therefore not recognized on the balance sheet.

(7) Use of key accounting estimates

Preparation of the consolidated financial statements in accordance with IFRS requires accounting estimates to be used and judgments made that have an impact on the amounts reported for, and the recognition of, assets, liabilities, income, and expenses.

The material assumptions and parameters for the accounting estimates that have been made are based on the information and data available at the time and are reviewed on an ongoing basis. Changes to accounting estimates are made prospectively.

Estimation uncertainties mainly relate to the following:

Business combinations (see (9)): Determination of the fair value of the identifiable assets acquired and liabilities assumed.

Intangible assets (see (10)): Impairment test – material assumptions on which the calculation of the recoverable amount is based.

Trade receivables (see (16)): Calculation of the expected default – default rates for the different time periods.

Pensions and similar obligations (see (21)): Measurement of defined benefit obligations – material actuarial assumptions.

Provisions (see (22)): Recognition and measurement of provisions – material assumptions about the probability and extent of the outflow of resources.

Deferred tax assets/liabilities (see (33)): Availability of future taxable profits against which deferred tax assets can be utilized.

Financial instruments (see (40b)): Financial instruments that are measured at fair value – input factors and methods.

(8) Scope of consolidation

In addition to Heraeus Holding GmbH, the consolidated financial statements include subsidiaries over which Heraeus Holding GmbH exercises control. Joint ventures and associates are also included using the equity method.

The financial year of the consolidated subsidiaries is the calendar year.

The following table shows the breakdown of consolidated entities:

Consolidated subsidiaries

	2023			2022		
	Total	In Germany	Outside Germany	Total	In Germany	Outside Germany
Balance as of Jan. 1	128	33	95	120	29	91
Additions	12	8	4	9	4	5
Disposals	- 8	- 2	- 6	-	-	-
Mergers	- 2	-	- 2	- 1	-	- 1
Balance as of Dec. 31	130	39	91	128	33	95

Joint ventures and associates included in the consolidated financial statements using the equity method

	2023			2022		
	Total	In Germany	Outside Germany	Total	In Germany	Outside Germany
Balance as of Jan. 1	9	1	8	8	1	7
Additions	2	2	-	1	-	1
Balance as of Dec. 31	11	3	8	9	1	8

(9) Corporate transactions

(a) Business combinations in 2023

The following acquisition took place in the reporting year:

	Type of acquisition	Voting rights acquired (%)	Date of acquisition
Heraeus Comvance			
OFS Fitel Denmark ApS, Denmark	Share deal	100.0	Jun. 30, 2023

The total consideration transferred came to €32.6 million (of which €31.3 million in cash).

The acquisition gives Heraeus Comvance the opportunity to add a new pillar to its business: supplying optical fibers to the European telecommunications market. On the one hand, a new region is being opened up, which will help to stabilize capacity utilization of the glass production facilities in Bitterfeld. On the other hand, new expertise and equipment in this stage of the value creation process will enable Heraeus Comvance to expand and improve the quartz glass product solutions that it is able to offer customers.

The following amounts were recognized for the assets and liabilities of the acquired company as of the acquisition date:

€ million

Non-current assets	28.8
Other intangible assets	4.6
Property, plant, and equipment	24.2
Current assets	5.5
Inventories – excluding precious metals	2.7
Cash and cash equivalents	0.3
Other assets	2.5
Assets acquired	34.3
Non-current liabilities	0.3
Deferred tax liabilities	0.3
Current liabilities	1.4
Other liabilities	1.4
Liabilities acquired	1.7
Net assets acquired	32.6

From the acquisition date, consolidated revenue for 2023 included revenue of €0.9 million generated by the acquired companies; the contribution to earnings from the acquisitions amounted to a loss of €4.4 million.

The hypothetical impact of the acquisition on revenue, assuming consolidation from the beginning of the year, would have been an increase of €0.9 million, and the impact on profit after taxes would have been a decrease of €4.4 million.

(b) Business combinations in 2022

The following acquisitions took place in the previous year:

	Type of acquisition	Voting rights acquired (%)	Date of acquisition
Heraeus Precious Metals			
Erbas SA, Switzerland	Share deal	100.0	Jul. 15, 2022

The total consideration transferred came to €8.9 million (of which €8.0 million had been transferred in cash as of December 31, 2022). Compared with the previous year, no adjustments were made regarding the purchase price allocation in 2023. No significant purchase price payments were made in 2023 in connection with the business combinations that took place in 2022.

(c) Disposals:

In 2022, Heraeus signed an agreement for the sale of 100 percent of the shares in Heraeus Nexensos to international electronics specialist Yageo. Heraeus Nexensos is a global industry leader in the field of high-precision temperature measurements using platinum thin-film technologies and the biggest manufacturer of platinum temperature sensors. These temperature sensors are used in vehicle exhaust gas systems as well as in electric vehicles and various industrial applications. Heraeus Nexensos is headquartered in Kleinostheim and operates an additional production site in Malaysia as well as sales units in the US, China, and other South East Asian countries. The company has around 480 employees. The sale was completed on March 31, 2023. Heraeus has concluded extensive service agreements with Yageo concerning the continuation of operations at the Kleinostheim site.

In September 2023, Heraeus reached an agreement with the US company Excelitas Technologies, based in Waltham, Massachusetts, for the sale of its specialty light sources division Heraeus Noblelight. Excelitas Technologies is acquiring 100 percent of the shares in Heraeus Noblelight and therefore all existing business activities and employees. Heraeus Noblelight is a leading supplier in the specialty light market and is very well positioned in terms of market access, problem-solving expertise, and technological breadth. The business is headquartered in Kleinostheim and operates production sites in Germany, the UK, the US, China, and Japan. It also has sales units in Europe and parts of South East Asia, and employs around 850 people. The sale was completed on December 31, 2023 after receiving regulatory approval. Consequently, Heraeus Noblelight is no longer part of the Heraeus Group and the name of the company has changed from Heraeus Noblelight to Excelitas Noblelight. Excelitas Noblelight will remain at its current location in Kleinostheim and various departments such as HR, IT, and HSO will continue to carry out work for the company.

(d) Acquisition of associates

In February 2023, Heraeus acquired 46.6 percent of the shares in the Berlin start-up Smart Steel Technologies (SST), whose solutions use artificial intelligence to optimize production processes in the steel industry.

In June 2023, Heraeus acquired 37.5 percent of the shares in the semiconductor start-up aiXscale Photonics GmbH, based in Aachen.

Notes to the consolidated balance sheet**(10) Intangible assets****(a) Goodwill**

Goodwill decreased from €527.4 million in 2022 to €482.8 million in the reporting year. The change was attributable to disposals of €29.3 million in connection with the sale of companies and to negative currency effects of €15.3 million.

Goodwill is usually monitored at operating company level. With the exception of the goodwill arising on the acquisition of Norwood Medical, none of this goodwill was material when considered individually.

The goodwill was tested for impairment in general on the basis of the value in use and a three-year planning period approved by management; the growth in EBITDA, calculated on the basis of past experience, is a key assumption in this context. The discount rates before taxes, which ranged from 9.1 percent to 12.9 percent (2022: 8.9 percent to 13.3 percent), were also key assumptions, as were the rates of growth in perpetuity, which ranged from 0 percent to 2 percent (2022: 0 percent to 2 percent). The detailed planning period may be extended in order to calculate the steady state for the perpetuity growth rate.

For the impairment test carried out on Norwood Medical, a discount rate before taxes of 9.1 percent (2022: 8.9 percent) and a rate of growth in perpetuity of 2 percent (2022: 2 percent) were applied. The recoverable amount exceeded the carrying amount by €89.0 million (2022: €97.4 million). The steady state had not yet been achieved due to planned synergy effects. This was taken into account through appropriate adjustments.

The following reasonably possible changes to key assumptions would have brought the value in use in line with the carrying amount:

- Raising the discount rate by 0.7 percentage points (2022: 0.7 percentage points)
- Lowering the perpetuity growth rate by 1.1 percentage points (2022: 1.0 percentage point)
- Lowering the EBITDA growth by 0.9 percentage points (2022: 0.8 percentage points)

As in 2022, no impairment losses on goodwill were recognized in the reporting year.

Goodwill was allocated to the operating companies as follows:

€ million	Dec. 31, 2023	Dec. 31, 2022
Heraeus Medevio	60.3	62.0
Norwood Medical	331.5	343.4
Heraeus Electronics	13.8	14.1
Heraeus Electro-Nite	25.5	26.5
Start-ups	22.7	23.3
Heraeus Precious Metals	29.0	27.4
Heraeus Noblelight	–	30.7
Goodwill	482.8	527.4

(b) Other intangible assets

€ million	Goodwill	Customer relationships, technologies, brands, licenses, and similar rights	Internally generated intangible assets	Total
Jan. 1, 2022				
Cost	507.6	951.4	6.1	1,465.1
Accumulated amortization and impairment	- 7.2	- 418.5	- 4.0	- 429.7
Net carrying amount	500.4	532.9	2.1	1,035.4
Financial year ended Dec. 31, 2022				
Net carrying amount as of Jan. 1, 2022	500.4	532.9	2.1	1,035.4
Exchange differences	27.2	28.5	-	55.7
Additions through business combinations	0.3	8.4	-	8.7
Additions	-	5.5	-	5.5
Disposals	-	0.3	- 0.3	-
Reclassifications	-	0.2	-	0.2
Amortization	-	- 56.5	- 0.6	- 57.1
Impairment losses	-	- 1.1	-	- 1.1
Disposals to assets held for sale	- 0.5	-	-	- 0.5
Net carrying amount as of Dec. 31, 2022	527.4	518.2	1.2	1,046.8
Dec. 31, 2022 / Jan. 1, 2023				
Cost	534.2	997.6	5.8	1,537.6
Accumulated amortization and impairment	- 6.8	- 479.3	- 4.6	- 490.7
Net carrying amount	527.4	518.3	1.2	1,046.9
Financial year ended Dec. 31, 2023				
Net carrying amount as of Jan. 1, 2023	527.4	518.3	1.2	1,046.9
Exchange differences	- 15.3	- 12.6	-	- 27.9
Additions through business combinations	-	4.6	-	4.6
Additions	-	1.4	0.2	1.6
Disposals	- 29.3	- 7.7	-	- 37.0
Reclassifications	-	- 0.3	1.4	1.1
Amortization	-	- 51.5	- 0.7	- 52.2
Net carrying amount as of Dec. 31, 2023	482.8	452.2	2.1	937.1
Dec. 31, 2023				
Cost	486.8	867.5	7.4	1,361.7
Accumulated amortization and impairment	- 4.0	- 415.3	- 5.3	- 424.6
Net carrying amount	482.8	452.2	2.1	937.1

The column 'Customer relationships, technologies, brands, licenses, and similar rights' contains a sum of €261.8 million (2022: €292.2 million) for customer relationships that were taken on as part of the acquisition of a company. The remaining useful life is 13 years (2022: 14 years).

Research and development costs amounting to €172.9 million (2022: €155.8 million) were recognized in the consolidated income statement.

(11) Property, plant, and equipment**(a) Property, plant, and equipment excluding right-of-use assets**

€ million	Land, land rights and buildings, including buildings on land owned by others	Plant and machinery	Office furniture and equipment	Assets under construction	Total
Jan. 1, 2022					
Cost	819.8	1,358.9	693.5	314.2	3,186.4
Accumulated depreciation and impairment	– 377.9	– 883.1	– 492.8	– 29.1	– 1,782.9
Net carrying amount	441.9	475.8	200.7	285.1	1,403.5
Financial year ended Dec. 31, 2022					
Net carrying amount as of Jan. 1, 2022	441.9	475.8	200.7	285.1	1,403.5
Exchange differences	3.2	8.1	2.3	0.8	14.4
Additions through business combinations	–	2.5	1.4	–	3.9
Additions	21.5	28.7	26.4	205.6	282.2
Disposals	– 2.0	– 2.0	– 1.5	– 0.1	– 5.6
Reclassifications	63.3	49.8	35.9	– 118.0	31.0
Depreciation	– 20.5	– 78.1	– 36.1	–	– 134.7
Impairment losses	– 0.6	– 23.1	– 15.9	– 0.3	– 39.9
Reversals of impairment losses	–	0.8	0.1	10.1	11.0
Net carrying amount as of Dec. 31, 2022	506.8	435.5	209.2	378.1	1,529.6
Financial year ended Dec. 31, 2022 / Jan. 1, 2023					
Cost	902.8	1,370.2	721.1	397.2	3,391.3
Accumulated depreciation and impairment	– 396.0	– 934.7	– 512.0	– 19.1	– 1,861.8
Net carrying amount	506.8	435.5	209.1	378.1	1,529.5
Financial year ended Dec. 31, 2023					
Net carrying amount as of Jan. 1, 2023	506.8	435.5	209.1	378.1	1,529.5
Exchange differences	– 6.0	– 9.6	– 2.1	– 7.1	– 24.8
Additions through business combinations	–	11.2	12.9	–	24.1
Additions	9.6	48.5	39.3	260.7	358.1
Disposals	– 4.7	– 7.5	– 3.8	– 9.7	– 25.7
Reclassifications	84.8	77.7	71.5	– 235.1	– 1.1
Depreciation	– 22.9	– 71.0	– 43.5	–	– 137.4
Impairment losses	–	– 2.4	– 4.8	– 6.1	– 13.3
Net carrying amount as of Dec. 31, 2023	567.6	482.4	278.6	380.8	1,709.4
Dec. 31, 2023					
Cost	973.1	1,420.4	802.5	405.0	3,601.0
Accumulated depreciation and impairment	– 405.5	– 938.0	– 523.9	– 24.2	– 1,891.6
Net carrying amount	567.6	482.4	278.6	380.8	1,709.4

The impairment losses of €13.2 million (2022: €30.7 million) recognized on property, plant, and equipment mainly relate to the Bitterfeld site and its activities in the field of optical fibers for telecommunications technology. Delays in infrastructure projects and growing competition mean that capacities in this area cannot be fully utilized. Further impairment losses are attributable to various businesses and sites around the world.

As in 2022, the impaired assets largely included facilities that were no longer found to be recoverable or that could no longer be used as originally intended. The assets involved were written off in full because they have no significant fair value and no material benefit can be obtained by continuing to use them. As in 2022, the impairment losses were reported in the consolidated income statement under the item 'Amortization, depreciation, and impairment'.

In the prior year, contrary to previous expectations, it became possible to use some equipment at the Bitterfeld site again as a result of planned changes of use. The corresponding reversals of impairment losses to amortized cost amounted to €9.7 million and were included in other operating income for the prior year.

(b) Right-of-use assets

The right-of-use assets mainly relate to rented properties outside Germany.

The following table shows a breakdown of the net carrying amount of the right-of-use assets and the depreciation on right-of-use assets by asset class:

€ million	Net carrying amounts		Depreciation	
	Dec. 31, 2023	Dec. 31, 2022	2023	2022
Land, land rights and buildings, including buildings on land owned by others	64.7	66.7	– 15.3	– 16.8
Plant and machinery	2.1	2.1	– 1.1	– 0.5
Office furniture and equipment	10.5	10.3	– 5.7	– 6.8
Right-of-use assets	77.3	79.1	– 22.1	– 24.1

Additions to right-of-use assets amounted to €31.9 million in the reporting year (2022: €28.2 million), of which none (2022: €4.0 million) were attributable to acquisitions. A purchase option on right-of-use assets of €29.6 million relating to land and buildings had been exercised in the prior year. The amount was reclassified to property, plant, and equipment excluding right-of-use assets.

Further details on leasing can be found in the following sections:

- Impairment on right-of-use assets: see (29)
- Expenses for leases where the underlying asset has a low value: see (31)
- Interest expenses on lease liabilities: see (32)
- Total cash outflow for leases: see (36)

(c) Property, plant, and equipment – total

Property, plant, and equipment consist of the following:

€ million	Dec. 31, 2023	Dec. 31, 2022
Property, plant, and equipment excluding right-of-use assets	1,709.4	1,529.6
Right-of-use assets	77.3	79.1
Property, plant, and equipment	1,786.7	1,608.7

(12) Investments accounted for using the equity method

The table below shows the aggregated financial information for the joint ventures and associates that are included in the Heraeus consolidated financial statements using the equity method:

€ million	Shin-Etsu Quartz Products Co., Ltd.	revalyu Resources GmbH	Non-material equity-accounted entities		Total for equity-accounted entities
			Joint ventures	Associates	
Balance as of Dec. 31, 2023					
Carrying amount of investment	110.4	57.1	40.8	81.7	290.0
Prorated profit	29.8	-3.3	4.4	-2.7	28.2
Balance as of Dec. 31, 2022					
Carrying amount of investment	102.3	60.4	41.4	52.1	256.2
Prorated profit	46.6	-1.9	6.6	5.9	57.2

Joint venture: Shin-Etsu Quartz Products Co., Ltd.

The operating activities of Shin-Etsu Quartz Products Co., Ltd., based in Tokyo, Japan, include the manufacture, sale and trading of quartz glass and associated products.

The table below shows a summary of the financial information for Shin-Etsu Quartz Products Co., Ltd.:

€ million	Dec. 31, 2023	Dec. 31, 2022
Share in percent	50.0	50.0
Non-current assets	96.0	88.2
Current assets	184.8	191.5
<i>thereof cash and cash equivalents</i>	<i>51.0</i>	<i>59.6</i>
Non-current liabilities	13.9	14.6
<i>thereof financial liabilities excluding trade payables and other liabilities</i>	<i>-</i>	<i>-</i>
Current liabilities	46.1	60.5
<i>thereof financial liabilities excluding trade payables and other liabilities</i>	<i>-</i>	<i>-</i>
Net assets (100%)	220.8	204.6
Share of net assets	110.4	102.3
Carrying amount of investment in joint venture	110.4	102.3
€ million	2023	2022
Distributions received	18.3	45.2
Revenue	178.6	216.8
Profit after taxes / total comprehensive income	73.9	93.2
Group's share in profit after taxes / total comprehensive income	29.8	46.6

Group's share in profit after taxes/total comprehensive income is reduced through elimination of intercompany profit.

Joint venture: revalyu Resources GmbH

The operating activities of revalyu Resources GmbH, a global specialist in PET recycling based in Kleinostheim, Germany, include the recycling of used PET bottles to produce PET ester that is then processed to create high-quality filament yarns for use in sustainable fabric. As not all key decisions can be made by Heraeus alone, Heraeus does not have control over revalyu Resources GmbH despite holding the majority of voting rights.

The table below shows a summary of the financial information for revalyu Resources GmbH:

€ million	Dec. 31, 2023	Dec. 31, 2022
Share in percent	53.38	53.38
Non-current assets	126.7	80.1
Current assets	59.7	56.8
<i>thereof cash and cash equivalents</i>	<i>47.8</i>	<i>49.1</i>
Non-current liabilities	72.6	20.1
<i>thereof financial liabilities excluding trade payables and other liabilities</i>	<i>72.6</i>	<i>20.1</i>
Current liabilities	6.9	3.6
<i>thereof financial liabilities excluding trade payables and other liabilities</i>	<i>0.9</i>	<i>0.1</i>
Net assets (100%)	106.9	113.2
Share of net assets	57.1	60.4
Carrying amount of investment in joint venture	57.1	60.4
€ million	2023	2022
Distributions received	–	–
Revenue	17.5	15.6
Profit after taxes / total comprehensive income	– 6.3	– 3.5
Group's share in profit after taxes / total comprehensive income	– 3.3	– 1.9

(13) Other financial assets

Other financial assets comprise the following items:

€ million	Dec. 31, 2023			Dec. 31, 2022*		
	Current	Non-current	Total	Current	Non-current	Total
Receivables from precious metal swaps	122.6	–	122.6	60.3	–	60.3
Financial assets	–	69.6	69.6	–	24.4	24.4
Derivatives with positive fair value	28.4	0.7	29.1	38.7	–	38.7
Lease receivables	1.4	2.7	4.1	1.3	2.0	3.3
Margin accounts, collateral pledged	6.0	–	6.0	10.0	–	10.0
Miscellaneous financial assets	65.5	16.0	81.5	63.6	62.6	126.2
Other financial assets	223.9	89.0	312.9	173.9	89.0	262.9

* Prior-year figures restated, see (2)

Margin accounts represent cash amounts that are pledged as collateral for futures transactions. The pledges expire when the collateralized transactions are settled.

Miscellaneous financial assets include a receivable from Zimmer Biomet Holdings Inc. Further information on this can be found in the disclosures relating to other operating income (see (30)).

(14) Other assets

Other assets are broken down as follows:

€ million	Dec. 31, 2023			Dec. 31, 2022		
	Current	Non-current	Total	Current	Non-current	Total
Other tax receivables	119.1	2.0	121.1	157.9	2.6	160.5
Advances paid	14.4	–	14.4	25.4	–	25.4
Contract assets	11.2	11.0	22.2	8.8	7.0	15.8
Miscellaneous non-financial assets	40.3	0.1	40.4	27.1	0.1	27.2
Other assets	185.0	13.1	198.1	219.2	9.7	228.9

(15) Inventories

The table below gives a breakdown of inventories:

€ million	Dec. 31, 2023	Dec. 31, 2022*
Materials and supplies	314.7	304.7
Work in progress, finished goods, and merchandise	461.0	438.8
Write-downs of inventories – excluding precious metals	– 71.1	– 80.8
Inventories – excluding precious metals	704.6	662.7
Precious metals	973.8	1,181.9
Write-downs of precious metals	– 15.0	– 11.6
Precious metals	958.8	1,170.3
Inventories	1,663.4	1,833.0

* Prior-year figures restated, see (2)

Impairment losses of €9.5 million (2022: €7.3 million) were recognized on inventories excluding precious metals in 2023. Reversals of write-downs on inventories excluding precious metals amounted to €13.4 million in 2023 (2022: €6.4 million). An amount of €2.9 million was recognized for write-downs of precious metals (2022: €0 million).

(16) Trade receivables

The breakdown of trade receivables is as follows:

€ million	Dec. 31, 2023	Dec. 31, 2022
Gross trade receivables	708.1	689.5
Impairment losses	– 35.6	– 37.4
Net trade receivables	672.5	652.1
Assets arising from bills of exchange	64.1	107.7
Trade receivables	736.6	759.8

Default risk is taken into account by the recognition of appropriate impairment losses. Risk-specific default rates are determined on the basis of historical default data and taking into account forward-looking macroeconomic indicators.

Assets arising from bills of exchange are guaranteed by banks. The credit risk is currently regarded as not material.

The table below shows changes in impairment losses recognized on gross trade receivables:

€ million	2023	2022
Impairment losses as of Jan. 1	- 37.4	- 34.6
Currency translation	1.1	0.2
Changes in scope of consolidation	1.2	-
Additions	- 7.6	- 7.3
Utilizations	1.0	1.5
Reversals	6.1	2.8
Impairment losses as of Dec. 31	- 35.6	- 37.4

The impairment loss of €1.5 million that was recognized in the consolidated income statement (2022: loss of €4.5 million) represents the net balance of additions and reversals.

The following table presents the provision matrix for 2023:

€ million	Term to maturity as of Dec. 31, 2023					Total
	Not due	less than 30 days	between 30 and 90 days	between 91 and 180 days	more than 180 days	
Gross trade receivables	546.6	100.5	21.3	13.8	25.9	708.1
Weighted average default rate	0.0%	0.2%	3.7%	84.1%	88.4%	
Impairment losses	- 0.1	- 0.2	- 0.8	- 11.6	- 22.9	- 35.6
Net receivables	546.5	100.3	20.5	2.2	3.0	672.5

The provision matrix for the previous year can be presented as follows:

€ million	Term to maturity as of Dec. 31, 2022					Total
	Not due	less than 30 days	between 30 and 90 days	between 91 and 180 days	more than 180 days	
Gross trade receivables	527.9	81.2	26.0	29.8	24.6	689.5
Weighted average default rate	0.1%	0.1%	8.5%	37.6%	95.9%	
Impairment losses	- 0.3	- 0.1	- 2.2	- 11.2	- 23.6	- 37.4
Net receivables	527.6	81.1	23.8	18.6	1.0	652.1

(17) Time deposits, cash and cash equivalents

Time deposits are deposits that initially have a fixed term of between three and twelve months. As of the balance sheet date, the residual maturities of their total amount of €128.0 million (2022: €0.0 million) could be broken down as follows:

- 1 to 3 months: €30.0 million
- 4 to 6 months: €68.0 million
- 7 to 9 months: €30.0 million

Cash and cash equivalents comprise the following items:

€ million	Dec. 31, 2023	Dec. 31, 2022
Credit balances with banks, cash on hand, and other cash	1,107.2	822.2
Short-term deposits	0.8	112.3
Cash and cash equivalents	1,108.0	934.5

(18) Equity attributable to the shareholders of Heraeus Holding GmbH

The subscribed capital is the maximum amount for which the shareholders of Heraeus Holding GmbH are liable in respect of the company's liabilities to creditors. As in 2022, the total subscribed capital of €210.0 million is made up of individual shares with a minimum face value of €10. All shares with the exception of those held by Heraeus Holding GmbH itself are dividend-bearing shares.

Most of the capital reserve comprises capital contributions by the shareholders. Retained earnings include the profits generated by Heraeus Holding GmbH and the subsidiaries included in the consolidated financial statements that have not been distributed. The line item also includes income from joint ventures and associates accounted for using the equity method, consolidation transactions recognized in profit or loss, and the effects of offsetting actuarial gains and losses arising from pensions and similar obligations, net of deferred taxes, against equity.

Other reserves comprise currency translation adjustments and the effects of the measurement of hedging transactions, taking deferred taxes into account. The gains and losses reported in the cash flow hedge reserve are reclassified to the consolidated income statement when the corresponding gains and losses from the hedged item are recognized through profit or loss. The reserve for the fair value measurement of equity instruments contains changes to the fair value of equity instruments that are not held for trading purposes and for which the option to recognize changes in other comprehensive income was exercised.

The Board of Managing Directors of Heraeus Holding GmbH have proposed a dividend distribution of €68.6 million (2022: €99.6 million) for the 2023 financial year.

(19) Non-controlling interests

Shares held by minority interests in the shareholders' equity of consolidated companies are reported under non-controlling interests.

The profits attributable to these shareholders in 2023 were €8.2 million (2022: €10.4 million). As in 2022, no losses were attributable to non-controlling interests.

(20) Capital management disclosures

The objective of capital management is to ensure financial flexibility in order to secure the continued existence of the company as a going concern over the long term, further develop the business portfolio, and enable the company to seize strategic opportunities. The target capital structure is defined by the competent decision-making bodies, taking due consideration of selected key financials such as the debt level and the equity ratio.

As of the balance sheet date, the capital structure was as follows:

€ million	Dec. 31, 2023	Dec. 31, 2022*	Change (%)
Shareholders' equity	4,681.0	4,541.2	3.1
Percentage of total shareholders' equity and liabilities	84.5	86.0	
Current financial debt	165.9	65.4	
Non-current financial debt	689.8	674.0	
Financial debt	855.7	739.4	15.7
Percentage of total shareholders' equity and liabilities	15.5	14.0	
Total shareholders' equity and liabilities (shareholders' equity plus financial debt)	5,536.7	5,280.6	4.8

* Prior-year figures restated, see (2)

Access to a broad range of financial instruments is deemed a crucial aspect of financial flexibility. In this context, Heraeus uses the unregulated capital market for public placements to institutional investors and private placements as well as the bank market via a broadly diversified group of major international banks.

The funding strategy is reflected in the credit ratings awarded by the rating agencies Moody's and Standard & Poor's.

The following table provides an overview of the corporate ratings of Heraeus:

	Dec. 31, 2023		Dec. 31, 2022	
	Moody's Investors Service	Standard & Poor's	Moody's Investors Service	Standard & Poor's
Non-current financial debt	Baa1	BBB+	Baa1	BBB+
Current financial debt	—	A-2	—	A-2
Outlook	stable	stable	stable	stable

(21) Pensions and similar obligations

Under the company pension scheme, employees of companies included in the consolidated financial accounts have entitlements to defined benefit and defined contribution pension schemes. Defined benefit pension schemes encompass both current pensions and entitlements to future pensions. The benefits paid by the Group usually depend on employees' years of service and earnings and are governed by different pension scheme rules. At Heraeus, defined benefit pension schemes are funded by way of both provisions and investment funds. The main pension arrangements are described below.

The payment obligations are predominantly attributable to German companies and relate to pension plans providing retirement benefits, invalidity benefits, and benefits paid to surviving dependants. These obligations are based, on the one hand, on defined benefit pension schemes with benefits based on length of service and final salary. These schemes have been closed to new members. On the other hand, employees who joined after January 1, 1988 have a direct pension entitlement under an employer-funded, contribution-based scheme that is not linked to final salary. The entitlement arises from the accumulation of pension components determined annually that are calculated on the basis of a defined pension expense and an age-related pension annuitization schedule. Since 2001, employees have also had the option of purchasing additional pension benefits by voluntarily converting remuneration into pension components that go toward a contribution-based scheme.

The contribution-based direct pension entitlements are each covered by investments in securities funds that meet the criteria for plan assets. Since their introduction, the pension schemes have been refined and adjusted in line with changes in economic conditions.

Members of the Board of Managing Directors and senior managers also have individual pension entitlements, which are predominantly based on employer-funded final salary schemes.

There are currently no statutory minimum funding requirements for the existing benefit obligations of Group companies in Germany.

Outside Germany, employees at several companies are also entitled to retirement pensions – some of which are subject to very different rules. The level of these entitlements generally depends on years of service and salary received. The bulk of the benefit obligations outside Germany are financed by investments in external funds that meet the criteria for plan assets.

The Group is exposed to various risks in connection with the defined benefit pension plans. In addition to general actuarial risks such as longevity and interest-rate risk, the Group is exposed to currency risk and – in the case of pension plan assets invested in funds – to capital-market and investment risks.

The calculation of the defined benefit obligations was primarily based on the actuarial assumptions in the table below. The figures stated for the discount rate and income growth outside Germany are averages weighted by the present value of the relevant benefit obligations.

(%)	Dec. 31, 2023		Dec. 31, 2022	
	In Germany	Outside Germany	In Germany	Outside Germany
Discount rate	3.55	2.96	4.20	3.23
Income growth (annual)	3.00	3.07	3.00	3.00
Pension adjustment (annual)	2.0 – 2.2	–	1.5 – 2.0	–
Future increase in healthcare costs	–	4.0 – 7.0	–	3.9 – 6.3

The defined benefit obligations of the companies in Germany are generally based on the updated biometric factors of the Heubeck 2018 G mortality tables of Professor Dr. Klaus Heubeck. Country-specific biometric factors are used to calculate the obligations of companies outside Germany.

The 'Pensions and similar obligations' line item on the consolidated balance sheet is a net liability that can be broken down as follows:

€ million	Dec. 31, 2023	Dec. 31, 2022
Pensions and similar obligations of companies in Germany	307.2	293.1
Pensions and similar obligations of companies outside Germany	40.3	32.7
Pensions and similar obligations	347.5	325.8

The table below shows the present value of the defined benefit obligation (broken down by type of cover) and its funded status:

€ million	Dec. 31, 2023			Dec. 31, 2022		
	In Germany	Outside Germany	Total	In Germany	Outside Germany	Total
Present value of funded defined benefit obligation	224.4	121.2	345.6	211.3	116.2	327.5
Present value of unfunded defined benefit obligation	240.5	30.4	270.9	232.3	30.5	262.8
Present value of the defined benefit obligation	464.9	151.6	616.5	443.6	146.7	590.3
Fair value of plan assets	– 157.7	– 111.3	– 269.0	– 150.5	– 114.0	– 264.5
Net liability	307.2	40.3	347.5	293.1	32.7	325.8

The present value of the defined benefit obligation of Group companies changed as follows:

€ million	2023			2022		
	In Germany	Outside Germany	Total	In Germany	Outside Germany	Total
Present value of the defined benefit obligation as of Jan. 1	443.6	146.7	590.3	689.2	186.1	875.3
Currency translation	–	3.0	3.0	–	1.3	1.3
Current service cost	4.2	5.4	9.6	8.5	6.4	14.9
Actuarial gains (–)/ losses (+)	50.0	1.9	51.9	– 230.9	– 40.8	– 271.7
Interest expenses	18.3	4.7	23.0	8.9	1.8	10.7
Employee contributions	5.8	2.6	8.4	6.1	2.8	8.9
Pension payments	– 17.6	– 9.5	– 27.1	– 17.8	– 14.4	– 32.2
Reclassification to liabilities directly associated with assets held for sale	–	–	–	– 18.4	–	– 18.4
Disposals	– 39.4	– 2.9	– 42.3	–	–	–
Other changes	–	– 0.3	– 0.3	– 2.0	3.5	1.5
Present value of the defined benefit obligation as of Dec. 31	464.9	151.6	616.5	443.6	146.7	590.3

A rise or fall of half of one percentage point in the main actuarial assumptions would have the following impact on the present value of the defined benefit obligation in Germany as of the balance sheet date:

Change in present value of defined benefit obligation in Germany (€ million)	Dec. 31, 2023	Dec. 31, 2022
Discount rate		
+ 0.5 percentage points	– 26.8	– 23.5
– 0.5 percentage points	31.6	26.6
Annual income growth		
+ 0.5 percentage points	0.8	0.9
– 0.5 percentage points	– 0.8	– 0.8
Annual pension adjustment		
+ 0.5 percentage points	18.0	16.2
– 0.5 percentage points	– 16.5	– 14.9

Starting with the original actuarial measurements, sensitivity analysis was carried out in isolation on each of the parameters deemed to be material in order to highlight their separate impact on the present value of the defined benefit obligation calculated at each balance sheet date. No potential correlation between the individual assumptions was taken into account. The calculations were repeated with the amended parameters and were not based on estimates so that they reflected the full impact of the changes in isolation.

The actuarial net losses of €50.0 million reported in Germany (2022: net gains of €230.9 million) comprised losses of €43.4 million (2022: gains of €234.9 million) attributable to changes in financial assumptions and losses of €6.6 million (2022: losses of €4.0 million) resulting from experience adjustments.

The present value of the defined benefit obligation was distributed across the following individual groups of pension beneficiaries at companies in Germany:

- active members: €210.8 million (2022: €206.3 million)
- former employees with vested rights: €66.1 million (2022: €59.2 million)
- pensioners and surviving dependants: €188.0 million (2022: €178.1 million)

The benefit obligations of companies outside Germany predominantly consist of obligations to active members of pension schemes. All of the obligations reported on the consolidated balance sheet were vested.

The weighted average duration of obligations in Germany as of December 31, 2023 was 15.6 years (2022: 14.6 years).

The defined benefit obligations in Germany are expected to result in payments as follows at the end of each of the next ten financial years:

- financial year 2024 (year 1): €16.7 million (2022: financial year 2023 – €16.7 million)
- financial years 2025–2028 (years 2 to 5): €74.2 million (2022: financial years 2024–2027 – €74.9 million)
- financial years 2029–2033 (years 6 to 10): €108.4 million (2022: financial years 2028–2032 – €110.2 million)

Outside Germany, pension entitlements are expected to result in pension payments of €17.6 million in 2024 (prior-year expectation for 2023: €11.7 million).

Changes in the fair value of the plan assets during 2023 for companies in and outside Germany are shown below:

€ million	2023			2022		
	In Germany	Outside Germany	Total	In Germany	Outside Germany	Total
Fair value of plan assets as of Jan. 1	150.5	114.0	264.5	176.8	132.5	309.3
Currency translation	–	3.3	3.3	–	0.5	0.5
Interest income	6.4	3.5	9.9	2.3	1.3	3.6
Return on (+)/expenses (–) from plan assets excl. interest income	7.6	– 7.6	–	– 29.3	– 18.9	– 48.2
Employer contributions	4.6	7.7	12.3	5.1	7.0	12.1
Employee contributions	5.8	2.6	8.4	6.1	2.9	9.0
Pension payments	– 2.9	– 8.9	– 11.8	– 3.6	– 13.9	– 17.5
Reclassification to liabilities directly associated with assets held for sale	–	–	–	– 6.9	–	– 6.9
Disposals	– 14.3	– 3.1	– 17.4	–	–	–
Other changes	–	– 0.2	– 0.2	–	2.6	2.6
Fair value of plan assets as of Dec. 31	157.7	111.3	269.0	150.5	114.0	264.5

Heraeus anticipates that employer contributions to plan assets for companies in Germany will be approximately €3.9 million in 2023 (2022: €4.8 million) and approximately €5.9 million (2022: €8.4 million) for companies outside Germany.

Plan assets relating to companies in and outside Germany comprised the following financial instruments and other assets:

€ million	Dec. 31, 2023			Dec. 31, 2022		
	In Germany	Outside Germany	Total	In Germany	Outside Germany	Total
Debt instruments	105.3	4.5	109.8	102.4	17.4	119.8
Equity instruments	52.4	14.3	66.7	47.9	12.6	60.5
Money-market-linked instruments and credit balances with banks	–	4.6	4.6	0.2	9.5	9.7
Real estate	–	13.2	13.2	–	11.4	11.4
Receivables from insurance companies	–	55.9	55.9	–	37.6	37.6
Mixed funds	–	16.9	16.9	–	21.0	21.0
Other assets	–	1.9	1.9	–	4.5	4.5
Fair value of plan assets	157.7	111.3	269.0	150.5	114.0	264.5

Liquid funds intended to meet the defined benefit obligations of companies in Germany are held in several retail funds. These funds are managed by Mercer Treuhand GmbH.

A strategic asset allocation was defined under the asset management strategy. Minimum and maximum quotas were also defined for each asset class, and the allocations should not exceed or fall below these quotas. The prescribed allocation of the assets to different asset classes is based on the term to maturity of the liabilities; the acceptable risk is defined on the basis of stress test scenarios. This strategy should help to generate attractive returns with a virtually constant level of risk. The portfolio is fine-tuned regularly so that the risk can be maintained at a constant level. The costs of managing the retail funds are borne by the funds themselves. The fund's assets do not include financial instruments issued by the company itself, or any real estate or other assets used by the company.

The table below shows a breakdown of the net pension expense reported in the consolidated income statement and the gains and losses recognized in other comprehensive income:

€ million	Note	2023			2022		
		In Germany	Outside Germany	Total	In Germany	Outside Germany	Total
Current service cost		– 4.2	– 5.4	– 9.6	– 8.5	– 6.4	– 14.9
Interest expenses of defined benefit obligation	(32)	– 18.3	– 4.7	– 23.0	– 8.9	– 1.8	– 10.7
Interest income on plan assets	(32)	6.4	3.5	9.9	2.3	1.3	3.6
Net pension expense – reported in the income statement		– 16.1	– 6.6	– 22.7	– 15.1	– 6.9	– 22.0
Actuarial gains (+)/losses (–) in the present value of the defined benefit obligation		50.0	1.9	51.9	230.9	40.8	271.7
Return on (+)/expenses from (–) plan assets excl. interest income		7.6	– 7.6	–	– 29.3	– 18.9	– 48.2
Gains (+)/losses (–) – recognized in other comprehensive income		57.6	– 5.7	51.9	201.6	21.9	223.5

The current service cost is reported in personnel expenses. The interest expense from unwinding the discount on the defined benefit obligation is offset against the interest income on plan assets and reported in net finance costs.

In addition to the defined benefit pension schemes, there are also defined contribution schemes. Expenses of €8.5 million (2022: €7.7 million) relating to these schemes were recognized in personnel expenses and they mainly concern companies outside Germany. Furthermore, employer contributions of €31.3 million (2022: €31.3 million) were paid into statutory pension insurance in Germany.

(22) Provisions

Provisions consist of the following:

€ million	Current provisions		Non-current provisions		Total	
	Dec. 31, 2023	Dec. 31, 2022	Dec. 31, 2023	Dec. 31, 2022	Dec. 31, 2023	Dec. 31, 2022
Provisions						
for personnel expenses	87.7	98.0	23.3	19.9	111.0	117.9
for warranties	8.6	10.3	1.1	4.2	9.7	14.5
for outstanding costs for precious metal recycling	7.5	9.3	–	–	7.5	9.3
for restructuring	4.5	9.8	–	0.1	4.5	9.9
for dismantling and disposal costs	–	–	4.5	3.8	4.5	3.8
for patent disputes and litigation	0.9	3.0	–	–	0.9	3.0
miscellaneous	39.9	46.2	14.4	17.1	54.3	63.3
Total	149.1	176.6	43.3	45.1	192.4	221.7

The current provisions for personnel expenses of €87.7 million (2022: €98.0 million) include bonus payments, severance payments, performance-related compensation, and other employee benefits. The provisions for restructuring relate to various programs that primarily affect locations in Germany.

The non-current provisions for personnel expenses of €23.3 million (2022: €19.9 million) mainly relate to long-service awards.

The following table shows changes in provisions in 2023:

€ million	Jan. 1, 2023	Currency translation	Additions	Unwinding of discount	Utilization	Reversal	Disposals	Dec. 31, 2023
Provisions								
for personnel expenses	117.9	– 1.6	92.9	0.5	– 87.3	– 6.5	– 4.9	111.0
for warranties	14.5	– 0.1	4.5	–	– 3.5	– 4.0	– 1.7	9.7
for outstanding costs for precious metal recycling	9.3	– 0.2	6.8	–	– 8.4	–	–	7.5
for restructuring	9.9	–	2.1	–	– 4.5	– 3.1	0.1	4.5
for dismantling and disposal costs	3.8	– 0.2	3.9	–	– 0.6	–	– 2.4	4.5
for patent disputes and litigation	3.0	–	0.1	–	– 1.6	– 0.6	–	0.9
miscellaneous	63.3	–	13.5	–	– 20.7	– 2.7	0.9	54.3
Total	221.7	– 2.1	123.8	0.5	– 126.6	– 16.9	– 8.0	192.4

(23) Financial debt

Financial debt is broken down as follows:

€ million	Dec. 31, 2023			Dec. 31, 2022		
	Current	Non-current	Total	Current	Non-current	Total
Bonds	–	498.3	498.3	–	497.8	497.8
Registered bonds	–	98.4	98.4	–	98.3	98.3
Lease liabilities	17.3	72.8	90.1	19.8	71.6	91.4
Liabilities to banks	148.6	20.3	168.9	45.6	6.3	51.9
Financial debt	165.9	689.8	855.7	65.4	674.0	739.4

The bond is a corporate bond issued by Heraeus Finance GmbH in June 2022 with a term to maturity of five years and a nominal placement volume of €500.0 million. It was recognized at its issue price of 99.502 percent and the discount will be amortized over the term of the bond using the effective interest method. The bond has a coupon of 2.625 percent p.a. and has been listed on the Luxembourg Exchange for trading in the unregulated euro MTF market. No covenants have been attached to the bond.

The table below provides a detailed breakdown of the registered bonds:

€ million	Dec. 31, 2023			Dec. 31, 2022		
	Current	Non-current	Total	Current	Non-current	Total
Effective interest rate						
4.01% – fixed rate	–	49.0	49.0	–	49.0	49.0
3.91% – fixed rate	–	49.4	49.4	–	49.3	49.3
Registered bonds	–	98.4	98.4	–	98.3	98.3

Heraeus Finance GmbH issued a registered bond with a nominal amount of €50.0 million and a term of 20 years in October 2012 and a further registered bond with a nominal amount of €50.0 million and a term of 21 years in January 2013. They were recognized at their issue price of 96.452 percent and 97.792 percent respectively; the discount will be amortized over the term of the registered bonds using the effective interest method. Heraeus Holding GmbH became the successor of Heraeus Finance GmbH in relation to these debt instruments and took over all rights and liabilities arising from and in connection with the two registered bonds upon conclusion of a debt assumption agreement on December 13, 2019.

(24) Other financial liabilities

Other financial liabilities are broken down as follows:

€ million	Dec. 31, 2023			Dec. 31, 2022*		
	Current	Non-current	Total	Current	Non-current	Total
Liabilities from precious metal swaps	232.9	–	232.9	174.7	–	174.7
Derivatives with negative fair value	19.8	3.7	23.5	51.7	9.5	61.2
Margin accounts, collateral received	31.3	–	31.3	0.1	–	0.1
Miscellaneous financial liabilities	33.0	3.8	36.8	34.0	4.7	38.7
Other financial liabilities	317.0	7.5	324.5	260.5	14.2	274.7

* Prior-year figures restated, see (2)

See Note (13) for our disclosures with regard to the margin accounts.

(25) Other liabilities

Other liabilities comprise the following items:

€ million	Dec. 31, 2023			Dec. 31, 2022		
	Current	Non-current	Total	Current	Non-current	Total
Liabilities from precious metal trading contracts	74.4	–	74.4	93.5	–	93.5
Other tax liabilities	93.6	–	93.6	107.7	–	107.7
Liabilities for personnel expenses	43.5	3.9	47.4	42.6	3.2	45.8
Contract liabilities	76.9	0.3	77.2	70.1	5.0	75.1
Miscellaneous non-financial liabilities	18.3	6.0	24.3	26.1	5.6	31.7
Other liabilities	306.7	10.2	316.9	340.0	13.8	353.8

The following table shows changes in contract liabilities in 2023:

€ million	2023	2022
Contract liabilities as of Jan. 1	75.1	55.4
Currency translation	– 3.9	– 1.1
Disposals in connection with sales of companies	– 3.9	–
Additions	68.9	72.4
Recognized as revenue	– 59.0	– 51.6
Contract liabilities as of Dec. 31	77.2	75.1

Contract liabilities mainly consist of advance payments for services that will be rendered in the next financial year.

(26) Trade payables

Trade payables are current liabilities and amounted to €393.5 million as of the end of the financial year (2022: €493.4 million). They also include liabilities in connection with the inhouse recycling inventory (see also (6f)).

Notes to the consolidated income statement

(27) Revenue

Revenue by business platform was allocated as follows:

€ million	2023	2022*
Metals & Recycling	448.8	444.3
Healthcare	880.1	802.6
Semiconductor & Electronics	740.6	780.1
Industrials	790.9	868.0
Corporate	1.5	4.8
Revenue excluding precious metals	2,861.9	2,899.8
Precious metal revenue	22,787.3	26,182.4
Revenue	25,649.2	29,082.2

* Prior-year figures restated to reflect the regrouping into business platforms

The breakdown of revenue by region was as follows:

€ million	2023	2022
Germany	300.3	307.9
Europe excluding Germany	608.2	603.0
Americas	967.4	931.1
Asia	919.7	1,004.2
Other	66.3	53.6
Revenue excluding precious metals	2,861.9	2,899.8
Precious metal revenue	22,787.3	26,182.4
Revenue	25,649.2	29,082.2

(28) Personnel expenses

Personnel expenses consist of the following:

€ million	2023	2022
Wages and salaries	- 976.2	- 949.2
Social security contributions and expenses for other benefits	- 133.9	- 127.7
Pension expenses	- 19.1	- 21.5
Personnel expenses	- 1,129.2	- 1,098.4

The breakdown of the average number of employees is as follows:

Business platforms	2023	2022*
Metals & Recycling	2,649	2,462
Healthcare	3,829	3,604
Semiconductor & Electronics	3,633	3,374
Industrials	4,435	4,866
Corporate	1,231	1,216
Total	15,777	15,522

* Prior-year figures restated

The remuneration of active members of the Board of Managing Directors for 2023 amounted to €9.9 million (2022: €10.6 million); of which €7.2 million (2022: €7.9 million) was performance related.¹ The remuneration represented short-term employee benefits. In addition, post-employment benefits for the Board of Managing Directors amounted to €0.5 million in 2023 (2022: €1.1 million). Dr. André Kobelt relinquished his duties as Managing Director of Heraeus Holding GmbH with effect from the end of December 31, 2023.

The remuneration for members of the Supervisory Board for 2023 amounted to €0.7 million (2022: €0.7 million). The total remuneration for the Shareholders' Committee was €0.1 million (2022: €0.1 million).

Former members of the Board of Managing Directors or their surviving dependants received remuneration of €1.3 million in 2023 (2022: €1.3 million). Obligations of €16.4 million (2022: €15.6 million) for current pensions and future pension rights existed for these persons as of the balance sheet date.

(29) Amortization, depreciation, and impairment

The table below provides a breakdown of depreciation, amortization, and impairment:

€ million	Note	2023	2022
Amortization of intangible assets	(10)	- 52.2	- 57.1
Depreciation of property, plant, and equipment		- 159.5	- 158.8
<i>thereof property, plant, and equipment excluding right-of-use assets</i>	(11a)	- 137.4	- 134.7
<i>thereof right-of-use assets</i>	(11b)	- 22.1	- 24.1
Amortization and depreciation		- 211.7	- 215.9
Impairment of intangible assets	(10)	-	- 1.1
Impairment of property, plant, and equipment		- 14.0	- 44.2
<i>thereof property, plant, and equipment excluding right-of-use assets</i>	(11a)	- 13.3	- 39.9
<i>thereof right-of-use assets</i>	(11b)	- 0.7	- 4.3
Impairment		- 14.0	- 45.3
Amortization, depreciation, and impairment		- 225.7	- 261.2

(30) Other operating income

The main individual items in other operating income were income from disposals (€111.6 million; 2022: €0.0 million) and income from the reversal of provisions (€10.2 million; 2022: €20.9 million). Other operating income did not include any foreign currency gains (2022: €9.5 million).

¹ Prior-year figures restated.

At the end of January 2022, Heraeus Medical GmbH and Zimmer Biomet Holdings Inc. achieved a first breakthrough in reaching a mutually acceptable solution in respect of the long-standing legal disputes between the two companies. Heraeus Medical had accused Zimmer Biomet of illegally exploiting its trade secrets. The agreement between the parties includes a payment in the low-triple-digit millions to be made by Zimmer Biomet to Heraeus Medical. In return, all currently pending lawsuits will be ended. On March 3, 2022, the parties signed the final settlement agreement that, among other things, sets out the details of the solution reached, such as payment terms for the settlement amount, the scope of the settled claims, the winding up of the pending legal proceedings, and the future handling of confidential information. The agreed payment is reported in other operating income for the prior year.

(31) Other operating expenses

Other operating expenses largely comprised expenses arising from external services (€142.7 million; 2022: €134.8 million), maintenance and repairs (€88.1 million; 2022: €88.7 million), and freight out (€66.1 million; 2022: €72.8 million). Other operating expenses also included foreign currency losses of €18.2 million (2022: €0.0 million).

Expenses for leases where the underlying asset has a low value amounted to €3.1 million (2022: €2.3 million) in the reporting year (see (11b)).

(32) Net finance costs

Net finance costs comprise the following income and expenses:

€ million	Note	2023	2022
Interest and similar income		40.8	27.1
Net changes from the measurement and disposal of financial assets measured at fair value		–	19.1
Finance income		40.8	46.2
Interest expenses and similar charges		– 46.6	– 46.8
Losses on the measurement of derivatives and loans		– 2.2	–
Net interest expenses for pensions and similar obligations	(21)	– 13.1	– 7.1
Interest expenses on lease liabilities	(11b)	– 3.3	– 3.1
Finance costs		– 65.2	– 57.0
Net finance costs		– 24.4	– 10.8

(33) Income taxes

The breakdown of income taxes is as follows:

€ million	2023	2022*
Current taxes in Germany	– 56.1	– 76.9
Current taxes outside Germany	– 77.5	– 78.6
Current taxes	– 133.6	– 155.5
<i>thereof from prior periods</i>	<i>14.3</i>	<i>9.5</i>
Deferred taxes	– 17.6	– 24.3
Income taxes	– 151.2	– 179.8

* Prior-year figures restated, see (2)

Deferred taxes are determined on the basis of the local tax rates applicable to each company in or outside Germany in accordance with the current legal situation in the country concerned.

The rates used to calculate deferred and current taxes in Germany were corporate income tax, including the solidarity surcharge, of 15.8 percent (2022: 15.8 percent) and trade tax, which varied from 13.4 percent to 17.9 percent (2022: 10.9 percent to 18.2 percent) depending on the local assessment rate. Consequently, tax rates of 29.2 percent to 33.8 percent (2022: 26.7 percent to 34.0 percent) applied to German Group companies.

Tax rates outside Germany varied between 4.8 percent and 50.8 percent (2022: 4.0 percent and 43.0 percent).

The table below shows the reconciliation of expected income tax expenses to the income tax expenses reported:

€ million	2023	2022*
Profit before taxes	595.4	684.4
Expected income tax expense (tax rate for Hanau site: 30.8 percent; 2022: 30.8 percent)	- 183.4	- 210.8
Variations:		
Difference between local tax rate and Group tax rate	67.0	55.1
Change in tax rate	- 6.1	0.4
Impairment losses / reversals of impairment losses	3.4	- 3.4
Tax-exempt income	- 5.5	3.2
Non-deductible operating expenses for tax purposes	- 28.4	- 6.3
Income tax for previous years	10.1	- 9.5
Other	- 8.3	- 8.5
Reported tax expenses	- 151.2	- 179.8
Effective tax rate (%)	25.4	26.3

* Prior-year figures restated, see (2)

The following deferred tax assets and deferred tax liabilities were attributable to differences in the recognition and measurement of individual line items on the balance sheet and to tax loss carryforwards:

€ million	Deferred tax assets		Deferred tax liabilities		Deferred tax expense (-) / tax income (+) reported in the income statement	
	Dec. 31, 2023	Dec. 31, 2022*	Dec. 31, 2023	Dec. 31, 2022*	2023	2022*
	Intangible assets	38.7	54.2	21.5	22.9	- 14.1
Property, plant, and equipment	6.4	9.7	89.6	81.6	- 11.3	- 0.5
Inventories	31.4	26.5	70.8	74.1	6.8	2.2
Other assets	28.9	24.2	46.1	39.4	- 11.5	16.7
Pensions and similar obligations	79.4	61.0	30.0	20.4	8.8	- 8.4
Provisions	17.4	14.9	4.7	5.0	2.8	0.1
Liabilities	33.2	29.6	2.9	0.8	1.5	- 13.8
Tax loss carryforwards	2.2	2.8	-	-	- 0.6	- 17.7
Total before offsetting	237.6	222.9	265.6	244.2	- 17.6	- 24.3
Offsetting	- 110.2	- 106.1	- 110.2	- 106.1	-	-
Total	127.4	116.8	155.4	138.1	- 17.6	- 24.3

* Prior-year figures restated, see (2)

Tax loss carryforwards as of December 31, 2023 amounted to €278.9 million (2022: €256.8 million). Deferred tax assets were recognized for €13.9 million of the total tax loss carryforwards (2022: €11.4 million). Loss carryforwards of €54.8 million (2022: €58.3 million) are subject to a time limit, with utilization of €27.5 million restricted to the next three years (2022: €26.9 million). There is no statutory expiration date for loss carryforwards of €224.1 million (2022:

€198.5 million). No deferred tax assets were recognized for tax loss carryforwards of €265.0 million (2022: €245.4 million) or for temporary differences arising on measurements for tax purposes in the amount of €107.2 million (2022: €130.4 million).

Based on the expected income for Group companies that incurred losses in 2023 or preceding years, deferred tax assets of €2.2 million (2022: €2.8 million) were recognized on loss carryforwards, and deferred tax assets of €43.2 million (2022: €40.9 million) were not recognized. Reversals of impairment losses were recognized in the amount of €24.8 million in 2023 (2022: €13.7 million). The utilization of previously unrecognized losses reduced the tax expense by €5.9 million (2022: €3.1 million). After deduction of the deferred tax liabilities, a deferred tax asset of €1.1 million (2022: €6.2 million) was recognized for the consolidated companies with a history of losses. Much of the loss carryforwards for these companies has already been utilized thanks to the strength of business in 2023.

Temporary differences in connection with investments in subsidiaries for which no deferred tax liabilities were recognized amounted to €731.1 million (2022: €676.8 million).

The Group operates in countries that have passed laws to introduce the global minimum tax rate ('Pillar 2'). The Group is applying the temporary, mandatory exemption with regard to the recognition of deferred taxes that arise from the introduction of Pillar 2 and is reporting these as tax expense or tax income at the point in time when they arise. Had Pillar 2 already applied in 2023, no significant additional tax expense would have arisen on the profits of the Group companies.

Notes to the consolidated cash flow statement

Cash flows are reported separately in the consolidated cash flow statement as net cash provided by/net cash used for operating activities, investing activities, or financing activities. Changes in the line items on the balance sheet used to prepare the consolidated cash flow statement are adjusted for the non-cash effects of currency translation and changes in the scope of consolidation. For this reason, the changes in the relevant balance sheet items cannot be directly reconciled with the figures from the consolidated balance sheet.

(34) Net cash provided by operating activities

Net cash provided by operating activities is derived indirectly from profit after taxes after adjustment for non-cash income and expenses.

Income tax payments in 2023 amounted to €126.8 million (2022: €95.9 million). The 'Change in other net assets' line item contains changes to other financial assets and liabilities and to other assets and liabilities.

Other non-cash transactions and other non-operating expenses essentially comprised deferred taxes, changes in the fair values of derivatives, income from investments accounted for using the equity method, and net pension expenses.

(35) Net cash used for investing activities

Outflows of cash and cash equivalents in connection with acquisitions amounted to €32.4 million (2022: €9.0 million). This figure includes minor amounts owed in connection with acquisitions in previous years that only caused a cash outflow in the reporting year. The proceeds from the disposal of business units relate to the sales of Heraeus Nexensos and Heraeus Noblelight (see (9)).

(36) Net cash used for financing activities

In 2023, a dividend of €99.6 million was paid to the shareholders of Heraeus Holding GmbH (2022: €45.1 million); a dividend of 12.4 million (2022: €0.0 million) was paid to the non-controlling interests.

The table below shows the changes in financial liabilities in 2023 for which cash flows have in the past been included or will in the future be included in the consolidated cash flow statement under net cash provided by/used for financing activities:

€ million	Jan. 1, 2023	Cash changes	Non-cash changes			Dec. 31, 2023
			Disposals	Currency effects	Other changes	
Non-current financial debt	674.0	14.9	- 4.5	- 2.1	7.5	689.8
Current financial debt	65.4	87.3	- 2.4	- 5.4	21.0	165.9
Total	739.4	102.2	- 6.9	- 7.5	28.5	855.7

In the reporting year, a total cash outflow of €20.7 million (2022: €22.1 million) was recognized in connection with leases (see (11b)).

The following table shows the corresponding changes in 2022:

€ million	Jan. 1, 2022	Cash changes	Non-cash changes			Dec. 31, 2022
			Acquisitions	Currency effects	Other changes	
Non-current financial debt	182.7	491.1	3.4	1.7	- 4.9	674.0
Current financial debt	597.5	- 537.5	1.7	1.1	2.6	65.4
Total	780.2	- 46.4	5.1	2.8	- 2.3	739.4

The cash changes in liabilities from financing activities can be reconciled to the consolidated cash flow statement as follows:

€ million	Dec. 31, 2023	Dec. 31, 2022
Cash change in liabilities from financing activities	102.2	- 46.4
Distributions, including distributions to non-controlling interests	- 112.0	- 45.1
Payments for the acquisition of non-controlling interests	- 20.7	-
Proceeds from disposal of treasury shares	1.0	0.5
Interest paid	- 49.2	- 49.8
Net cash used for financing activities	- 78.7	- 140.8

(37) Cash and cash equivalents

Cash and cash equivalents at the end of the period consisted exclusively of the cash and cash equivalents reported on the consolidated balance sheet, namely cash on hand, credit balances with banks, short-term money market funds, and other cash amounting to €1,108.0 million (2022: €936.9 million). In the prior year, a sum of €- 2.4 million had been reported for assets classified as held for sale.

Further disclosures regarding financial instruments

(38) Financial risk management

(a) General

In its operational and financing activities, the Heraeus Group is primarily exposed to interest-rate risk, currency risk, price risk, credit risk, and liquidity risk. These risks are measured, managed, and monitored by the Group's risk management system and financial management system.

Corporate Treasury and Precious Metal Trading are responsible for mitigating the risks that are described in greater detail below by taking out hedges as and when appropriate. The use of such hedges is governed by clear, standard policies that apply throughout the Group. Compliance is monitored at all times, and policies are amended as required. Heraeus is not exposed to any significant concentrations of risk arising from financial transactions. For further information, please refer to the opportunity and risk report in the group management report.

(b) Interest-rate risk

Interest-rate risk is the risk of changes in interest rates adversely impacting the financial position or financial performance of the Heraeus Group. The avoidance of interest-rate risk always takes priority, but the upside potential of changes in interest rates can also be exploited. The Group's main sources of long-term funding are currently one standard bond and two privately placed registered bonds. Interest-rate derivatives can be used to support interest-rate management. The derivatives that are used can be standard market instruments, such as interest-rate swaps and options for placing upper and lower limits on interest rates (caps, floors, and collars).

As in 2022, Heraeus was not exposed to any material cash-flow interest-rate risk arising from liabilities in 2023, because it had primarily taken out fixed-rate loans.

(c) Currency risk

Because of its international focus, the Heraeus Group is exposed to currency risk, which arises from movements in the exchange rates of various foreign currencies. Again, the avoidance of risk takes precedence over the exploitation of opportunities arising from movements in exchange rates. All hedges relate to underlying transactions that are already in existence or highly probable. As of the balance sheet date, currency risk largely comprised US\$ 72.4 million or €65.5 million (2022: US\$ 70.2 million or €65.8 million).

To help manage its currency risk, Heraeus uses derivatives based on these underlying transactions. As well as spot transactions, it primarily uses currency forwards and currency swaps.

Currency forwards are used principally to hedge operational cash flows arising from transactions for the supply and purchase of goods and services that are highly probable. Currency swaps are generally entered into in connection with intercompany loans in foreign currency.

(d) Other price risks

Precious metals constitute a key resource in the Heraeus Group. They are subject to market volatility and consequently entail price risk. The Precious Metal Trading unit uses standard market hedging instruments to hedge price risk, mainly precious metal leases, cash-and-carry transactions (precious metal swaps), forwards, and futures. Forwards and futures contracts that fall within the scope of IFRS 9 do not entail price risk from an economic perspective because they are taken out to hedge open positions. The accounting risk and impact on the income statement are therefore not material.

(e) Credit risk

Credit risk arising from financial assets consists of the risk that counterparties will default, and hence is limited to a maximum of the carrying amount of the assets transacted with each counterparty. The credit risk relating to derivatives is their replacement cost (market value). The risk of specific counterparties defaulting is constantly monitored using credit spreads and by grouping counterparties into different categories according to their credit quality.

Valuation allowances for expected defaults are recognized to reflect the risk arising from non-derivative financial instruments. Financial transactions are only concluded with counterparties of good credit standing. Investments in interest-bearing securities, if any, are predominantly limited to investment-grade securities.

(f) Liquidity risk

Liquidity risk describes the risk that a company might be unable to meet its financial obligations in full. Liquidity risk largely results from short-term trade payables, liabilities from derivatives, and other financial liabilities.

As a result of its investment-grade rating, confirmed by two independent rating agencies (see (20)), the Heraeus Group is guaranteed sufficient liquidity. Its rating ensures that it can access both the short-term commercial-paper market and the long-term capital market. It also holds sufficient cash and cash equivalents and has unutilized loan facilities with various banks. Risk concentrations are minimized by limiting the amounts invested at individual, selected investment-grade banks.

The risk of liquidity shortages is monitored by Corporate Treasury. Effective cash management and the ability to access sufficient liquidity even in times of crisis minimize the risk of the Heraeus Group being unable to meet its financial obligations.

(g) Sensitivity analysis

Heraeus uses sensitivity analysis to analyze market risk. The following table shows sensitivity to potential movements in the US dollar exchange rate within reasonable parameters. All other variables remain constant. The impact on profit before taxes of the Heraeus Group is caused by changes in the fair values of financial assets and liabilities. The Group's risk arising from exchange rate movements in respect of all other currencies is not material.

€ million	Change in USD / EUR exchange rate	Impact on profit before taxes	Impact on shareholders' equity
2023	+ 5 %	- 3.4	- 0.7
	- 5 %	3.1	0.6
2022	+ 5 %	- 3.5	- 1.6
	- 5 %	3.1	1.5

(39) Derivative financial instruments**(a) Cash flow hedges**

In 2023, the rules for hedge accounting were applied for hedging cash flows. The hedges are to protect Heraeus against fluctuations in exchange rates for contractually agreed forward sales transactions. The amounts left in other comprehensive income as of December 31, 2023 are expected to be settled in 2024 and then recognized in profit or loss.

In addition, hedging is used to protect cash flows from transactions that are deemed highly probable against precious metal price risks. The hedging instruments are forward transactions in precious metals that fall due in 2024.

As part of the bond placement in June 2022, forward starting swaps for a value equivalent to the issuance volume were concluded. The five-year interest rate was fixed at an average of minus 0.0782 percent. These forward starting swaps were settled on the date of issuance of the bond. The fair value as of the settlement date was recognized in other comprehensive income and will be reclassified to profit or loss incrementally over the term to maturity of the bond.

The following tables contain information on hedging instruments:

€ million	Nominal amount hedging instrument	Carrying amounts of hedging instruments as of Dec. 31, 2023		Line item in the balance sheet	Change in fair value used for measuring ineffectiveness for the period
		Assets	Liabilities		
Foreign currency exchange risk					
Currency forwards (EUR/USD)	11.8	-	0.3	Other financial liabilities	0.5
Precious metal price risk					
Precious metal forward transactions	4.3	1.9	-	Other financial assets	1.7

€ million	Nominal amount hedging instrument	Carrying amounts of hedging instruments as of Dec. 31, 2022		Line item in the balance sheet	Change in fair value used for measuring ineffectiveness for the period
		Assets	Liabilities		
Foreign currency exchange risk					
Currency forwards (EUR/USD)	27.7	–	2.2	Other financial liabilities	– 1.8
Precious metal price risk					
Precious metal forward transactions	15.2	1.1	–	Other financial assets	1.1

The following information relates to the hedged items:

€ million	2023		2022	
	Change in value used for measuring ineffectiveness	Other reserves – Cash flow hedges	Change in value used for measuring ineffectiveness	Other reserves – Cash flow hedges
Foreign currency exchange risk				
Forward sale transactions in USD	– 0.5	– 0.3	1.8	– 2.2
Precious metal price risk				
Forecast purchase of precious metals	– 1.7	1.9	– 1.1	1.1
Interest-rate risk				
Bond	–	25.3	–	32.7

The hedging transactions affect the statement of comprehensive income as follows:

€ million	2023			
	Hedging gain or loss recognized in other comprehensive income	Ineffectiveness recognized in profit or loss	Amount reclassified from other comprehensive income to profit or loss	Line item in the statement of profit or loss for reclassification
Foreign currency exchange risk				
Hedge of USD exchange rate for forward sales transactions	0.5	–	1.4	Other operating expenses
Precious metal price risk				
Hedge of precious metal price for forecast purchases	1.7	–	– 0.7	Cost of materials
Interest rate risk				
Hedge of 5-year interest rate for bond	–	–	– 7.4	Finance costs
Total	2.2	–	– 6.7	

€ million	2022			Line item in the statement of profit or loss for reclassification
	Hedging gain or loss recognized in other comprehensive income	Ineffectiveness recognized in profit or loss	Amount reclassified from other comprehensive income to profit or loss	
Foreign currency exchange risk				
Hedge of USD exchange rate for forward sales transactions	- 1.8	-	7.3	Other operating income
Precious metal price risk				
Hedge of precious metal price for forecast purchases	1.1	-	-	
Interest rate risk				
Hedge of 5-year interest rate for bond	33.2	-	- 4.1	Finance costs
Total	32.5	-	3.2	

(b) Economic currency hedges

Currency forwards are generally entered into in connection with intercompany loans in foreign currency and their settlement dates coincide with the maturity dates of the loans. Hedge accounting is not applied to these currency forwards. Consequently, individual currency forward contracts are recognized as assets or liabilities, and changes in their fair value are recognized in profit or loss.

(c) Offsetting of derivatives

The Heraeus Group enters into derivative transactions in accordance with the German Master Agreement for Financial Derivatives Transactions (DRV FT). This agreement does not meet the criteria for offsetting on the consolidated balance sheet, because it only confers the right of offset if future events occur, such as default or insolvency of the Group or of counterparties. The following table shows the potential financial impact of offsetting the arrangements described, regardless of whether they are not offset on the consolidated balance sheet pursuant to IAS 32.42.

€ million	Dec. 31, 2023			Dec. 31, 2022		
	Gross amounts of financial instruments on the consolidated balance sheet	Amounts from netting arrangements	Net amounts	Gross amounts of financial instruments on the consolidated balance sheet	Amounts from netting arrangements	Net amounts
Derivative assets	29.1	- 1.0	28.1	38.7	- 1.6	37.1
Derivative liabilities	23.5	- 1.0	22.5	61.2	- 1.6	59.6

(40) Classification and fair values of financial instruments**(a) Categories**

The following table shows the carrying amounts of financial instruments by category and the fair values of each class of financial instrument:

€ million	Note	Carrying amount Dec. 31, 2023	Measurement category and carrying amount pursuant to IFRS 9				Fair value Dec. 31, 2023
			Fair value hedging instruments	Mandatorily at fair value through profit or loss	Fair value through other comprehen- sive income	Amortized cost	
Financial assets							
Cash and cash equivalents	(17)	1,108.0	–	–	–	1,108.0	n.a.
Time deposits	(17)	128.0	–	–	–	128.0	n.a.
Trade receivables	(16)	736.6	–	–	–	736.6	n.a.
Other financial assets:							
Derivatives with positive fair value not used as hedges	(13)	27.2	–	27.2	–	–	27.2
Derivatives with positive fair value used as hedges	(13)	1.9	1.9	–	–	–	1.9
Loans	(13)	9.4	–	–	–	9.4	9.4
Other financial assets measured at fair value	(13)	60.2	–	60.1	0.1	–	60.2
Other financial assets	(13)	214.2	–	–	–	214.2	n.a.
			1.9	87.3	0.1	2,196.2	
Financial liabilities							
Trade payables	(26)	393.5	–	–	–	393.5	n.a.
Financial debt:							
Bonds	(23)	498.3	–	–	–	498.3	499.6
Liabilities to banks	(23)	168.9	–	–	–	168.9	n.a.
Registered bonds	(23)	98.4	–	–	–	98.4	103.3
Lease liabilities	(23)	90.1	–	–	–	90.1	n.a.
Other financial liabilities:							
Derivatives with negative fair value not used as hedges	(24)	23.2	–	23.2	–	–	23.2
Derivatives with negative fair value used as hedges	(24)	0.3	0.3	–	–	–	0.3
Other financial liabilities measured at fair value	(24)	4.5	–	4.5	–	–	4.5
Other financial liabilities	(24)	296.5	–	–	–	296.5	n.a.
			0.3	27.7	–	1,545.7	

€ million	Note	Carrying amount Dec. 31, 2022	Measurement category and carrying amount pursuant to IFRS 9				Fair value Dec. 31, 2022
			Fair value hedging instruments	Mandatorily at fair value through profit or loss	Fair value through other comprehensive income	Amortized cost	
Financial assets							
Cash and cash equivalents	(17)	934.5	–	–	–	934.5	n.a.
Trade receivables	(16)	759.8	–	–	–	759.8	n.a.
Other financial assets:							
Derivatives with positive fair value not used as hedges*	(13)	37.7	–	37.7	–	–	37.7
Derivatives with positive fair value used as hedges	(13)	1.0	1.0	–	–	–	1.0
Loans	(13)	12.0	–	–	–	12.0	12.0
Other financial assets measured at fair value	(13)	12.4	–	12.0	0.4	–	12.4
Other financial assets	(13)	199.8	–	–	–	199.8	n.a.
			1.0	49.7	0.4	1,906.1	
Financial liabilities							
Trade payables	(26)	493.4	–	–	–	493.4	n.a.
Financial debt:							
Bonds	(23)	497.8	–	–	–	497.8	476.9
Liabilities to banks	(23)	51.9	–	–	–	51.9	n.a.
Registered bonds	(23)	98.3	–	–	–	98.3	96.0
Lease liabilities	(23)	91.4	–	–	–	91.4	n.a.
Other financial liabilities:							
Derivatives with negative fair value not used as hedges*	(24)	59.0	–	59.0	–	–	59.0
Derivatives with negative fair value used as hedges	(24)	2.2	2.2	–	–	–	2.2
Other financial liabilities measured at fair value	(24)	5.8	–	5.8	–	–	5.8
Other financial liabilities	(24)	207.7	–	–	–	207.7	n.a.
			2.2	64.8	–	1,440.5	

* Prior-year figures restated, see (2)

Cash and cash equivalents, trade receivables, trade payables, liabilities to banks, and other financial assets and liabilities all have predominantly short terms to maturity. No fair values were presented for these financial instruments because they were approximately equal to their carrying amounts.

(b) Market performance

The fair values of derivatives that are traded in an active market are determined based on market prices. Suitable valuation methods taking into account observable market data as of the balance sheet date are used to determine the fair values of derivatives that are not traded in an active market. The fair value of currency forwards is calculated on the basis of the par method based on market data on the balance sheet date. The actual market prices achievable on the balance sheet date may differ from the values calculated in this way. Generally accepted option pricing models (Black-Scholes method) are used to measure the fair value of options. Credit risk is determined using the add-on method and deducted directly from the positive or negative fair value of derivatives.

The discounted cash flow (DCF) method based on inputs observable in the market is used to calculate the fair value of loans and registered bonds.

The fair values recognized for financial instruments were determined as follows:

€ million	Dec. 31, 2023		Dec. 31, 2022	
	Assets	Liabilities	Assets	Liabilities
Mark-to-model values determined using parameters observed in the market (Level 2)	29.1	- 23.5	38.7	- 61.2
Other financial assets:	29.1	-	38.7	-
Derivatives with positive fair value not used as hedges*	27.2	-	37.7	-
Derivatives with positive fair value used as hedges	1.9	-	1.0	-
Other financial liabilities:	-	- 23.5	-	- 61.2
Derivatives with negative fair value not used as hedges*	-	- 23.2	-	- 59.0
Derivatives with negative fair value used as hedges	-	- 0.3	-	- 2.2
Theoretical mark-to-model values (Level 3)	60.2	- 4.5	12.4	- 5.8
Other financial assets	60.2	-	12.4	-
Other financial liabilities	-	- 4.5	-	- 5.8

* Prior-year figures restated, see (2)

The DCF method based on unobservable inputs, such as economic growth and the discount rate, is used to determine the fair values recognized at Level 3. A change in the input factors as part of a sensitivity analysis does not have any material effect on measurement. The following table shows the change in the fair values of other financial assets and other financial liabilities at Level 3 in 2023:

€ million	2023		2022	
	Assets	Liabilities	Assets	Liabilities
Balance as of Jan. 1	12.4	- 5.8	20.4	- 6.6
Gains(+) / Losses(-) recognized in the income statement	- 2.4	0.3	- 2.6	0.3
Additions	51.0	-	2.5	-
Disposals / settlements	- 0.1	0.8	- 8.2	0.7
Gains(+) / Losses(-) recognized in other comprehensive income	- 0.3	-	-	-
Exchange differences recognized in other comprehensive income	- 0.4	0.2	0.3	- 0.2
Balance as of Dec. 31	60.2	- 4.5	12.4	- 5.8

The gains and losses recognized in the income statement are included in the following items:

- Assets: finance costs and income
- Liabilities: other operating income

The gains and losses recognized in other comprehensive income relate to the item 'Currency translation adjustment' and to the item 'Equity instruments measured at fair value'.

At the end of each reporting period, the financial assets and liabilities measured at fair value are assessed to ascertain whether they need to be transferred between levels of the fair value hierarchy. As in 2022, there were no transfers during the reporting year.

The fair values disclosed for financial instruments measured at amortized cost were determined as follows:

€ million	Dec. 31, 2023		Dec. 31, 2022	
	Assets	Liabilities	Assets	Liabilities
Mark-to-model values determined using parameters observed in the market (Level 1)	–	– 499.6	–	– 476.9
Bonds	–	– 499.6	–	– 476.9
Mark-to-model values determined using parameters observed in the market (Level 2)	9.4	– 103.3	12.0	– 96.0
Loans	9.4	–	12.0	–
Registered bonds	–	– 103.3	–	– 96.0

(41) Net gains and losses on financial instruments

The following table shows net gains/losses by measurement category:

€ million	2023	2022
Financial assets and liabilities mandatorily measured at fair value through profit and loss	28.7	– 33.2
Financial assets measured at amortized cost	8.8	72.8
Financial liabilities measured at amortized cost	– 18.4	– 16.5
Net gain / loss	19.1	23.1

The net gain/loss on financial assets and liabilities measured at fair value through profit or loss is the result of measurement subsequent to initial recognition and includes net interest income/expense. In all other categories, net interest income/expense and net gains/losses on currency translation, impairment, and disposal were taken into account.

In 2023, interest income of €25.6 million (2022: €7.3 million) was generated and interest expenses of €18.4 million (2022: €16.5 million) were incurred in connection with financial assets and liabilities that are not measured at fair value through profit or loss.

(42) Maturity analysis

The following table shows the contractually agreed (undiscounted) principal payments, including estimated interest payments, of the non-derivative financial liabilities and derivative financial liabilities held on the Heraeus Group's books as of December 31, 2023:

€ million	Cash flows			
	2024	2025	2026 – 2028	from 2029
Non-derivative financial liabilities:				
Bonds	5.8	13.1	539.4	–
Registered bonds	1.4	3.8	11.3	118.8
Liabilities to banks	148.6	2.8	17.5	–
Trade payables	393.5	–	–	–
Lease liabilities	20.5	16.7	33.2	35.0
Other financial liabilities	297.2	–	0.2	3.7
Derivative financial liabilities:				
Derivatives with negative fair value not used as hedges	19.6	3.2	0.4	–
Derivatives with negative fair value used as hedges	0.3	–	–	–

The contractually agreed (undiscounted) interest and principal payments for the non-derivative financial liabilities and the derivative financial liabilities as of December 31, 2022 were as follows:

€ million	Cash flows			
	2023*	2024	2025 – 2027	from 2028
Non-derivative financial liabilities:				
Bonds	5.8	13.1	539.4	–
Registered bonds	1.4	3.8	11.3	122.5
Liabilities to banks	45.7	2.8	3.5	–
Trade payables	493.4	–	–	–
Lease liabilities	22.6	17.9	33.9	32.6
Other financial liabilities	208.9	1.0	0.2	3.5
Derivative financial liabilities:				
Derivatives with negative fair value not used as hedges	50.2	4.3	3.9	0.6
Derivatives with negative fair value used as hedges	1.4	0.8	–	–

* Prior-year figures restated, see (2)

Variable cash flows were recognized at the reference interest rate applicable as of each balance sheet date. Foreign currency amounts were translated at the spot rate applicable as of each balance sheet date.

Other disclosures

(43) Contingent liabilities

There were no material contingent liabilities as of the balance sheet date.

(44) Other financial commitments

As of the balance sheet date, order commitments for capital expenditure on property, plant, and equipment amounted to €93.0 million (2022: €86.7 million), of which €93.0 million is payable in 2024 (2022: €86.0 million payable in 2023 and €0.7 million in 2024).

As of the balance sheet date, the total market value of the precious metals on loan from third parties amounted to €1,947.0 million (2022: €1,767.0 million). As lessee, Heraeus is not required to recognize the precious metals it has leased or its corresponding obligations to return them in its consolidated balance sheet.

The Group's supply of precious metals is partly secured by medium- to long-term framework agreements. The quantity to be purchased can be sold on at any time with no price risk.

(45) Related party disclosures

Disclosures regarding remuneration for the Board of Managing Directors, Supervisory Board, and Shareholders' Committee as key management positions can be found in Note (28).

From a capital perspective, the shares in Heraeus Holding GmbH are predominantly held by EVG Tertio GmbH & Co. KG. However, no significant voting rights are attached to these shares. Consequently, no consolidated financial statements are prepared at this level. The voting shares in Heraeus Holding GmbH and the shares in Einhorn Verwaltungsgesellschaft mbH (parent company of EVG Tertio GmbH & Co. KG) are in free float and are held by a number of shareholders.

The following table shows material trading relationships between Group entities and related parties:

€ million	Receivables		Liabilities		Revenue		Goods and services received	
	Dec. 31, 2023	Dec. 31, 2022	Dec. 31, 2023	Dec. 31, 2022	2023	2022	2023	2022
	Associates	5.1	6.2	–	–	16.1	38.3	–
Joint ventures	45.6	11.1	2.6	1.3	43.9	51.0	17.9	22.9
Total	50.7	17.3	2.6	1.3	60.0	89.3	17.9	23.6

These trading relationships mainly relate to the Semiconductor & Electronics business platform and were concluded at arm's-length conditions.

Receivables include loans to associates in an amount of €5.0 million (2022: €5.0 million) and loans to joint ventures in an amount of €37.0 million (2022: €4.7 million). These loans have a long term to maturity and are not collateralized. They have terms of between three and seven years; the interest rates range from 3.25 percent to 5 percent (2022: 3.25 percent to 5 percent).

(46) Events after the reporting period

There were no significant events after the reporting period.

Additional disclosures pursuant to the German Commercial Code (HGB)

(47) Auditors' fees

The total fees paid to KPMG AG Wirtschaftsprüfungsgesellschaft for auditing services in 2023 amounted to €1.8 million. The fee for tax consultancy services was €0.1 million, and €0.1 million was spent on other services.

(48) Exemption pursuant to section 264 (3) HGB and section 264b HGB

The following German subsidiaries will make use of the exemption provisions of section 264 (3) HGB and section 264b HGB for 2023:

Contract Medical International GmbH, Dresden
Heraeus Amloy Technologies GmbH, Hanau
Heraeus Beteiligungsverwaltungsgesellschaft mbH, Hanau
Heraeus Business Solutions GmbH, Hanau
Heraeus Consulting & IT Solutions GmbH, Hanau
Heraeus Electronics GmbH & Co. KG, Hanau
Heraeus Electro-Nite GmbH & Co. KG, Hanau
Heraeus Epurio GmbH, Hanau
Heraeus Finance GmbH, Hanau
Heraeus Health & Education Services GmbH, Hanau
Heraeus Medevio GmbH & Co. KG, Hanau
Heraeus Medical GmbH, Wehrheim
Heraeus Metals Germany GmbH & Co. KG, Hanau
Heraeus Precious Metals GmbH & Co. KG, Hanau
Heraeus Quarzglas Bitterfeld GmbH & Co. KG, Hanau
Heraeus Quarzglas GmbH & Co. KG, Hanau
Heraeus Quarzglas International GmbH, Hanau
Heraeus Quarzglas Verwaltungsgesellschaft mbH, Hanau
Heraeus Site Operations GmbH & Co. KG, Hanau
Heraeus Special Warehousing GmbH & Co. KG, Hanau
Heraeus UV Solutions GmbH, Hanau
Huvenca 1 GmbH, Hanau

(49) List of shareholdings

The shareholdings of Heraeus Holding GmbH as of December 31, 2023 are listed below:

Name of company	Registered office	Country	Percentage of equity
1. Subsidiaries included in the consolidated financial statements			
In Germany			
Amorphous Metal Solutions GmbH	Homburg	Germany	100.00
Argor-Heraeus Deutschland GmbH	Pforzheim	Germany	100.00
Contract Medical International GmbH	Dresden	Germany	100.00
Heraeus Amloy Technologies GmbH	Hanau	Germany	100.00
Heraeus Battery Technology GmbH	Hanau	Germany	100.00
Heraeus Beteiligungsverwaltungsgesellschaft mbH	Hanau	Germany	100.00
Heraeus Business Solutions GmbH	Hanau	Germany	100.00
Heraeus Consulting & IT Solutions GmbH	Hanau	Germany	100.00
Heraeus Electronics GmbH & Co. KG	Hanau	Germany	100.00
Heraeus Electronics International GmbH	Hanau	Germany	100.00
Heraeus Electronics Verwaltungs GmbH	Hanau	Germany	100.00
Heraeus Electro-Nite GmbH & Co. KG	Hanau	Germany	100.00
Heraeus Electro-Nite Verwaltungsgesellschaft mbH	Hanau	Germany	100.00
Heraeus Epurio GmbH	Hanau	Germany	100.00
Heraeus Finance GmbH	Hanau	Germany	100.00
Heraeus Health & Education Services GmbH	Hanau	Germany	100.00
Heraeus Medevio GmbH & Co. KG	Hanau	Germany	100.00
Heraeus Medevio International GmbH	Hanau	Germany	100.00
Heraeus Medevio Verwaltungs GmbH	Hanau	Germany	100.00
Heraeus Medical GmbH	Wehrheim	Germany	100.00
Heraeus Metals Germany GmbH & Co. KG	Hanau	Germany	100.00
Heraeus Metals Germany Treuhand GmbH	Hanau	Germany	100.00
Heraeus Precious Metals GmbH & Co. KG	Hanau	Germany	100.00
Heraeus Precious Metals Verwaltungs GmbH	Hanau	Germany	100.00
Heraeus Quarzglas Bitterfeld GmbH & Co. KG	Hanau	Germany	100.00
Heraeus Quarzglas GmbH & Co. KG	Hanau	Germany	100.00
Heraeus Quarzglas International GmbH	Hanau	Germany	100.00
Heraeus Quarzglas Treuhand GmbH	Hanau	Germany	100.00
Heraeus Quarzglas Verwaltungsgesellschaft mbH	Hanau	Germany	100.00
Heraeus Real Estate Development GmbH	Hanau	Germany	100.00
Heraeus Real Estate Development Verwaltungs GmbH	Hanau	Germany	100.00
Heraeus Site Operations Energy GmbH	Hanau	Germany	100.00
Heraeus Site Operations GmbH & Co. KG	Hanau	Germany	100.00
Heraeus Site Operations III GmbH	Hanau	Germany	100.00
Heraeus Site Operations Verwaltungs GmbH	Hanau	Germany	100.00
Heraeus Special Warehousing GmbH & Co. KG	Hanau	Germany	100.00
Heraeus UV Solutions GmbH	Hanau	Germany	100.00
HUVENCA 1 GmbH	Hanau	Germany	100.00
W. C. Heraeus International GmbH	Hanau	Germany	100.00
Outside Germany			
Argor-Heraeus Italia S.p.A.	Cavenago Brianza	Italy	100.00

Name of company	Registered office	Country	Percentage of equity
Argor-Heraeus SA	Mendrisio	Switzerland	100.00
Contract Medical International, spol. s.r.o.	Hradec Králové	Czech Republic	100.00
Dong Yang Ceramic Inc.	Pyeongtaek-si	South Korea	100.00
ETS Wound Care LLC	Rolla, MO	USA	100.00
Heraeus (China) Investment Co., Ltd.	Shanghai	China	100.00
Heraeus (Thailand) Ltd.	Bangkok	Thailand	100.00
Heraeus Asia Pacific Holding Pte. Ltd.	Singapore	Singapore	100.00
Heraeus Comvance Denmark ApS	Brøndby	Denmark	100.00
Heraeus Conamic North America LLC	Phoenix, AZ	USA	100.00
Heraeus Conamic UK Ltd.	Wallsend	United Kingdom	100.00
Heraeus CZ s.r.o.	Prague	Czech Republic	100.00
Heraeus Electronic Chemicals (Shanghai) Co. Ltd	Shanghai	China	100.00
Heraeus Electronics Technology (Suzhou) Co., Ltd.	Suzhou	China	100.00
Heraeus Electro-Nite (Aust.) Pty. Ltd.	Unanderra	Australia	100.00
Heraeus Electro-Nite (Pty.) Ltd.	Boksburg	South Africa	100.00
Heraeus Electro-Nite (Tangshan) Co., Ltd.	Tangshan	China	100.00
Heraeus Electro-Nite (UK) Ltd.	Chesterfield	United Kingdom	100.00
Heraeus Electro-Nite AB	Lidingö	Sweden	100.00
Heraeus Electro-Nite Canada Ltd.	Toronto, ON	Canada	100.00
Heraeus Electro-Nite Chelyabinsk LLC	Chelyabinsk	Russia	100.00
Heraeus Electro-Nite Co., LLC	Wilmington, DE	USA	100.00
Heraeus Electro-Nite Espana S.L.	Cayés-Llanera	Spain	100.00
Heraeus Electro-Nite France S.A.R.L.	Illange	France	100.00
Heraeus Electro-Nite Instrumentos Ltda.	Diadema, SP	Brazil	100.00
Heraeus Electro-Nite International N.V.	Houthalen	Belgium	100.00
Heraeus Electro-Nite Italy S.r.l.	Ornago-Milan	Italy	100.00
Heraeus Electro-Nite Japan, Ltd.	Ichikawa-shi	Japan	100.00
Heraeus Electro-Nite L.L.C.	Moscow	Russia	100.00
Heraeus Electro-Nite Mexicana S.A. de C.V.	Ramos Arizpe, COA	Mexico	100.00
Heraeus Electro-Nite Polska Sp. z o.o.	Sosnowiec	Poland	100.00
Heraeus Electro-Nite Shanghai Co. Ltd.	Shanghai	China	100.00
Heraeus Electro-Nite Shenyang Co. Ltd.	Shenyang	China	100.00
Heraeus Electro-Nite Taicang Co. Ltd.	Taicang	China	100.00
Heraeus Electro-Nite Taiwan Ltd.	Kaohsiung City	Taiwan	100.00
Heraeus Electro-Nite Termoteknik Sanayi ve Ticaret A.S.	Sincan-Ankara	Türkiye	100.00
Heraeus Electro-Nite Ukraina LLC	Zaporizhzhia	Ukraine	100.00
Heraeus Epurio LLC	Wilmington, DE	USA	100.00
Heraeus Hellas Monoprosopi EPE	Athens	Greece	100.00
Heraeus Inc.	Wilmington, DE	USA	100.00
Heraeus K.K.	Tokyo	Japan	100.00
Heraeus Korea Corporation	Suwon-si	South Korea	100.00
Heraeus Ltd.	Hong Kong	China	100.00
Heraeus Materials Malaysia Sdn. Bhd.	Kuala Lumpur	Malaysia	100.00
Heraeus Materials S.A.	Yverdon-les-Bains	Switzerland	100.00
Heraeus Materials Singapore Pte. Ltd.	Singapore	Singapore	100.00
Heraeus Materials Technology Shanghai Ltd.	Shanghai	China	100.00
Heraeus Materials Technology Taiwan Ltd.	Taipei City	Taiwan	100.00

Name of company	Registered office	Country	Percentage of equity
Heraeus Medical AB	Stockholm	Sweden	100.00
Heraeus Medical Australia Pty. Ltd.	Macquarie Park, NSW	Australia	100.00
Heraeus Medical Components Caribe, Inc.	San Juan	Puerto Rico	100.00
Heraeus Medical Components LLC	Wilmington, DE	USA	100.00
Heraeus Medical Components S.R.L.	San Antonio de Belén	Costa Rica	100.00
Heraeus Medical Components Singapore Pte. Ltd.	Singapore	Singapore	100.00
Heraeus Medical LLC	Wilmington, DE	USA	100.00
Heraeus Medical Poland Sp. z o.o.	Warsaw	Poland	100.00
Heraeus Medical Schweiz AG	Zurich	Switzerland	100.00
Heraeus Medical UK Ltd.	Newbury	United Kingdom	100.00
Heraeus Metal Processing Ltd.	Shannon	Ireland	100.00
Heraeus Metals (Shanghai) Co., Ltd.	Shanghai	China	100.00
Heraeus Metals Hong Kong Ltd.	Hong Kong	China	100.00
Heraeus Metals New York LLC	Wilmington, DE	USA	100.00
Heraeus Nederland B.V.	Amsterdam	Netherlands	100.00
Heraeus PGM SA (Pty.) Ltd.	Gqeberha	South Africa	100.00
Heraeus Photovoltaics (Shanghai) Co., Ltd.	Shanghai	China	100.00
Heraeus Photovoltaics Singapore Pte. Ltd.	Singapore	Singapore	100.00
Heraeus Photovoltaics Technology (Shanghai) Co., Ltd.	Shanghai	China	100.00
Heraeus Precious Metal Technology (China) Co., Ltd.	Nanjing	China	100.00
Heraeus Precious Metals North America Conshohocken LLC	Wilmington, DE	USA	100.00
Heraeus Precious Metals North America LLC	Wilmington, DE	USA	100.00
Heraeus Quartz North America LLC	Wilmington, DE	USA	100.00
Heraeus Real Estate UK Ltd.	Cambridge	United Kingdom	100.00
Heraeus Romania S.R.L.	Chişoda	Romania	100.00
Heraeus SAH (Pty.) Ltd.	Gqeberha	South Africa	100.00
Heraeus S.A.	Madrid	Spain	100.00
Heraeus S.A.S.	Villebon-sur-Yvette	France	100.00
Heraeus S.p.A.	Milan	Italy	100.00
Heraeus ShinEtsu Quartz China Inc.	Shenyang	China	100.00
Heraeus South Africa (Pty.) Ltd.	Gqeberha	South Africa	100.00
Heraeus Technologies India Private Ltd.	New Delhi	India	100.00
Heraeus Tokmak Kiyetli Madenler Sanayi A.S.	Kemalpaşa-Izmir	Türkiye	95.00
Heraeus TROT (Wuhan) Engineering and Technology Co., Ltd.	Wuhan	China	100.00
Heraeus Zhaoyuan Changshu Electronic Materials Co. Ltd.	Changshu	China	80.00
Heraeus Zhaoyuan Precious Metal Materials Co. Ltd.	Zhaoyuan	China	60.00
MC Sublance Probe Technology Shanghai Co., Ltd.	Shanghai	China	100.00
Mo Sci LLC	Rolla, MO	USA	100.00
Norwood Medical LLC	Wilmington, DE	USA	100.00
PT. Woojin Electro Nite Indonesia	Cilegon	Indonesia	100.00
Pulse Systems, LLC	Wilmington, DE	USA	100.00
SKO A.S.	Istanbul	Türkiye	100.00
Woojin Electro-Nite Inc.	Pyeongtaek-si	South Korea	100.00

Name of company	Registered office	Country	Percentage of equity
2. Subsidiaries not included in the consolidated financial statements			
Outside Germany			
ETS Technology Holdings LLC	Rolla, MO	USA	100.00
HEN RBS Trustees Ltd.	Chesterfield	United Kingdom	100.00
Heraeus Electro-Nite Vietnam Co. Ltd.,	Da Nang City	Vietnam	100.00
Minco (Shanghai) Metallurgical Co., Ltd.	Shanghai	China	100.00
Mo Sci Health Care LLC	Rolla, MO	USA	100.00
PT Heraeus Materials Indonesia	Tangerang City	Indonesia	99.59
3. Associates accounted for under the equity method included in the consolidated financial statements			
In Germany			
Smart Steel Technologies GmbH	Berlin	Germany	46.55
aiXscale Photonics GmbH	Aachen	Germany	37.50
Outside Germany			
Ankasa Regenerative Therapeutics, Inc.	Wilmington, DE	USA	30.52
Choksi Heraeus Private Ltd.	Udaipur, Rajasthan	India	50.00
Ravindra Heraeus Private Ltd.	Udaipur, Rajasthan	India	50.00
4. Joint ventures accounted for under the equity method included in the consolidated financial statements			
In Germany			
revalyu Resources GmbH	Hanau	Germany	53.38
Outside Germany			
Argor-Aljba SA	Mendrisio	Switzerland	50.00
BASF Heraeus Metal Resource Co. Ltd.	Pinghu	China	50.00
Heraeus Shin-Etsu Quartz Singapore Pte. Ltd.	Singapore	Singapore	50.00
Shin-Etsu Quartz Products Co., Ltd.	Tokyo	Japan	50.00
Young Shin Quartz Co., Ltd.	Gwanghyewon-myun	South Korea	50.00

Hanau, March 6, 2024

The Board of Management of Heraeus Holding GmbH



Jan Rinnert
Chairman



Dr. Frank Stietz



Rolf Wetzel

Independent auditors' report

To Heraeus Holding GmbH, Hanau

Opinions

We have audited the consolidated financial statements of Heraeus Holding GmbH, Hanau, and its subsidiaries (the Group), which comprise the consolidated balance sheet as at 31 December 2023, and the consolidated income statement, consolidated statement of comprehensive income, consolidated statement of changes in equity and consolidated cash flow statement for the financial year from 1 January to 31 December 2023, and notes to the consolidated financial statements, including a summary of significant accounting policies. In addition, we have audited the group management report of Heraeus Holding GmbH for the financial year from 1 January to 31 December 2023.

In accordance with German legal requirements, we have not audited the content of those components of the group management report specified in the "Other Information" section of our auditor's 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 IFRSs as adopted by the EU, and the additional requirements of German commercial law pursuant to Section 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 2023, and of its financial performance for the financial year from 1 January to 31 December 2023, and
- the accompanying group management report as a whole provides an appropriate view of the Group's position. In all material respects, this group 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 group management report does not cover the content of those components of the group management report specified in the "Other Information" section of the auditor's report.

Pursuant to Section 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 the group management report.

Basis for the Opinions

We conducted our audit of the consolidated financial statements and of the group management report in accordance with Section 317 HGB and the German Generally Accepted Standards of Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer [Institute of Public Auditors in Germany] (IDW) and in supplementary compliance with the International Standards on Auditing (ISAs). Our responsibilities under those requirements, principles and standards are further described in the "Auditor's Responsibilities for the Audit of the Consolidated Financial Statements and of the Group Management Report" section of our auditor's report. We are independent of the group entities in accordance with the requirements of German commercial and professional law, and we have fulfilled our other German professional responsibilities in accordance with these requirements. We believe that the evidence we have obtained is sufficient and appropriate to provide a basis for our opinions on the consolidated financial statements and on the group management report.

Other Information

Management and/or the Supervisory Board are/is responsible for the other information. The other information comprises the following components of the group management report, whose content was not audited:

- information extraneous to management reports and marked as unaudited.

The other information also includes the remaining parts of the annual report. The other information does not include the consolidated financial statements, the group management report information audited for content and our auditor's report thereon.

Our opinions on the consolidated financial statements and on the group management report do not cover the other information, and consequently we do not express an opinion or any other form of assurance conclusion thereon.

In connection with our audit, our responsibility is to read the other information and, in so doing, to consider whether the other information

- is materially inconsistent with the consolidated financial statements, with the group management report information audited for content or our knowledge obtained in the audit, or
- otherwise appears to be materially misstated.

Responsibilities of Management and the Supervisory Board for the Consolidated Financial Statements and the Group Management Report

Management is 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 Section 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, management is responsible for such internal control as it has 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, management is 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, management is responsible for the preparation of the group 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, management is responsible for such arrangements and measures (systems) as they have considered necessary to enable the preparation of a group 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 group 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 group management report.

Auditor's Responsibilities for the Audit of the Consolidated Financial Statements and of the Group 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 group 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 group management report.

Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Section 317 HGB 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 group management report.

We exercise professional judgement and maintain professional scepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements and of the group 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 controls.

- 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 group 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 management and the reasonableness of estimates made by management and related disclosures.
- Conclude on the appropriateness of management's 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 group 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 Section 315e (1) HGB.
- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Group to express opinions on the consolidated financial statements and on the group management report. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our opinions.
- Evaluate the consistency of the group 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 on the prospective information presented by management in the group management report. On the basis of sufficient appropriate audit evidence we evaluate, in particular, the significant assumptions used by management 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.

Frankfurt am Main, 6 March 2024

KPMG AG
Wirtschaftsprüfungsgesellschaft
[Original German version signed by:]

Höfter
Wirtschaftsprüfer
[German Public Auditor]

Böhm
Wirtschaftsprüferin
[German Public Auditor]

Multi-year overview

	2023	2022*	2021	2020	2019
Financial performance (€ million)					
Revenue excluding precious metals	2,862	2,900	2,272	2,052	2,200
Total revenue	25,649	29,082	29,506	31,532	21,570
Earnings before interest, tax, depreciation, amortization, and impairment (EBITDA)	846	956	714	502	407
Earnings before interest and tax (EBIT)	620	695	524	302	222
Profit before taxes (EBT)	595	684	496	263	158
Profit after taxes	444	505	369	191	115
Financial position (€ million)					
Total assets	7,318	7,152	6,994	5,915	5,497
Shareholders' equity	4,681	4,541	3,801	3,280	3,293
Equity-to-assets ratio (%)	64	63	54	56	60
Cash flow (€ million)					
Net cash provided by operating activities	634	692	608	345	378
Cash payments for investments in non-current assets	360	288	248	197	233
Depreciation, amortization, and impairment of non-current assets (excluding right-of-use assets)	203	233	168	176	158
Employees					
Employees at year-end	15,170	15,938	13,911	13,911	14,190
In Germany	4,750	5,375	5,149	5,290	5,464
Outside Germany	10,420	10,563	9,965	8,621	8,726

* Prior-year figures restated, see Note (2) to the consolidated financial statements

Legal notice

Publisher

Heraeus Business Solutions GmbH
Communications & Marketing
Heraeusstrasse 12–14
63450 Hanau, Germany

This financial report contains the full consolidated financial statements and group management report of Heraeus Holding GmbH, Hanau, for 2023 as well as additional voluntary disclosures. This financial report is also available in German. Reproduction is permitted in whole or in part, provided the source is acknowledged in all cases.

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