

Heraeus

Financial report 2022

Key financial indicators for the Group

	2022	2021	Change (%)
Financial performance (€ million)			
Revenue excluding precious metals	2,900	2,272	+ 27.6
Total revenue	29,082	29,506	- 1.4
Earnings before interest, tax, depreciation, amortization, and impairment (EBITDA)	949	714	+ 32.9
Earnings before interest and tax (EBIT)	688	524	+ 31.3
Profit before taxes (EBT)	677	496	+ 36.5
Profit after taxes	499	369	+ 35.2
Financial position (€ million)			
Total assets	7,129	6,994	+ 1.9
Shareholders' equity	4,533	3,801	+ 19.3
Equity-to-assets ratio (%)	64	54	
Cash flow (€ million)			
Net cash provided by operating activities	692	608	+ 13.8
Cash payments for investments in non-current assets	288	248	+ 16.1
Depreciation, amortization, and impairment of non-current assets	233	168	+ 38.7
Employees			
Employees at year-end	15,938	15,114	+ 5.5
In Germany	5,375	5,149	+ 4.4
Outside Germany	10,563	9,965	+ 6.0

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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 focus 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,

2022 was a year like no other. We were shocked by Russia's invasion of Ukraine and the enormous suffering that it has inflicted on the Ukrainian people. Many of our employees found ways to lend assistance and still continue to participate in aid and support projects. As a company, we were able to support a variety of organizations with donations. This war contravenes the core values that we as a company have championed for decades: democracy, freedom, understanding among peoples and cultures, openness, and tolerance.

In addition to plunging the international political order into turmoil, the invasion has also thrown economic dependencies into sharp relief. Energy prices rocketed in response, especially in Europe, and subsequently stabilized at a high level. At our European sites, we created dedicated working groups in order to help us manage these high prices and potential supply shortages. Certain supply chains also continued to be disrupted, which resulted in further increases in the prices of raw materials and intermediate products. Both factors had a negative impact on our overall result.

Fortunately, most countries gradually felt the pressures associated with the coronavirus pandemic ease over the course of the year. Even China recently abandoned its strict zero-COVID policy, although this was followed by a renewed surge in infections in the country.

The operating businesses held up well and delivered very positive results despite these challenging external conditions. The Group's total revenue amounted to €29.1 billion in 2022. Revenue excluding precious metals went up by 27.6 percent year on year to €2.9 billion. Adjusted for currency effects, the increase was 21.8 percent. Profit after taxes rose to a new record high of €499.4 million in the reporting year, boosted by positive non-recurring items.

High demand in the fields of activity Electronics and Health was a key driver behind this encouraging performance. Activities with precious metals in the field of activity Environmental also improved further from an already high level. Another positive achievement was the smooth integration of the acquired company Norwood Medical from Dayton, Ohio (US), a leading manufacturer of medical components. Norwood Medical was able to attract new customers, grew as planned, and met all targets that had been set for it.

Our start-ups and investments also proved successful. Using purpose-built machines, they demonstrated the performance capabilities of their products and continued to pursue growth, albeit at different stages of maturity. Our portfolio company revalyu, for example, is currently expanding its site in India and has kicked off the construction of a new PET bottle recycling plant in the US.

We were also able to drive forward important strategic M&A topics in the reporting year. With BASF as a partner, we agreed the foundation of a joint venture in China that will focus on cutting-edge methodologies for the recycling of precious metals. The joint venture will help to establish the principles of the circular economy in China by recycling used catalytic converters from vehicles and reclaiming the platinum group metals contained in them. In October, Heraeus entered into an agreement with international electronics specialist Yageo for the sale of 100 percent of the shares in Heraeus Nexensos from the field of activity Industrials. The sale was completed on February 28, 2023.

Sustainability was once again treated as a priority across the whole Heraeus Group in 2022. All operating businesses have developed decarbonization plans that are aligned with the goal of limiting global warming to no more than 1.5°C. Plans in the field of activity Environmental have reached a very advanced stage. In relation to certain applications, we have committed to becoming carbon-neutral by 2025 and reaching net zero as of 2033.

We also made good progress with internal changes in the Group: The service platforms Heraeus Business Solutions and Heraeus Consulting & IT Solutions were launched on January 1, 2022. Both entities were spun off from Heraeus Holding with the aim of boosting business with high-value services and consultancy services.

In 2023, we want to forge ahead on our growth path. The fundamental picture in our markets is robust, despite concerns about a recession in some industries. The Heraeus Group projects a moderate trend for revenue excluding precious metals, but believes that profit after taxes will decline due to the absence of positive one-off items that boosted the profit for 2022.

We are currently in a phase where new technologies and transformative changes in the economic landscape are shaping new value chains. We want to tap their potential by expanding our capacity, broadening our portfolio, and launching new products. At the same time, we will stay focused on strengthening the competitiveness of our business by striving for excellence and driving forward digitalization. We want to promote innovation, make intelligent investments in new opportunities, and shape opportunities together with our customers.

Our heartfelt thanks go to all employees of the Heraeus Group for their hard work and dedication in this extremely challenging but successful year.

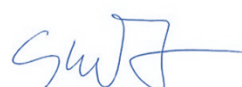
The Board of Managing Directors of Heraeus Holding GmbH



Jan Rinnert
Chairman



Dr. André Kobelt



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
Dr. Frank Stietz
Rolf Wetzel

Supervisory Board of Heraeus Holding GmbH

Franz Haniel Chairman
Florian Pieroth Vice Chairman
Dr. Simone Bagel-Trah
Dr. Hans-Tjabert Conring
Birgit Heraeus-Roggendorf
Dr. Hubert Lienhard
Annette Lukas
Uwe Raschke
Peter Schuld
Dr. Markus Binder
Dr. Martina Gieg
Christian Stübing

Report of the Supervisory Board

**Dear shareholders,
dear readers,**

In spite of a challenging competitive environment shaped by various sources of geopolitical tension, the Heraeus Group delivered encouraging results in 2022. Most of the external factors that shaped the conditions in the reporting year will continue to affect us in 2023.

The Board of Managing Directors has made determined progress in developing and refining the strategic focus of the Heraeus Group. Key topics in this context include professional business development that takes account of environmental, social, and corporate governance (ESG) aspects, the reduction of carbon emissions, and efficient energy management.

Dialogue with the Board of Managing Directors

In 2022, 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. In addition, the Supervisory Board was regularly and comprehensively updated about significant business transactions.

In the meetings, the Board of Managing Directors informed the Supervisory Board about current business performance and the further development and prospects of the individual business units, and provided a summary report of performance at Group level. The Supervisory Board and the Board of Managing Directors discussed all fundamental matters of corporate policy, business development, 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.

In addition, 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 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 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 2022, along with three information events. One written resolution was circulated for approval outside the meetings. The Board of Managing Directors also kept the Supervisory Board comprehensively informed of all current issues.

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. All members of the Supervisory Board participated in all meetings. 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 letter dated February 24, 2022, the Board of Managing Directors informed the Supervisory Board about the situation in Ukraine and Russia and its implications for Heraeus.

On April 5, 2022, the Supervisory Board met for an information event at which it heard a comprehensive report on the results of the 2020 precious metals recycling inventory.

At a meeting on April 27, 2022, the Supervisory Board was updated on the performance of the business and current M&A projects. Moreover, the Supervisory Board 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, 2021, 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. The Board of Managing Directors reported on the 2021 financial year and on the current financial year, including a risk report on the current year.

At its meeting on June 11, 2022, 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 focus of the Supervisory Board meeting on August 9, 2022, was on reports concerning the planned sale of 100 percent of the shares in Heraeus Nexensos GmbH and the adoption of a resolution regarding the relocation and expansion of Heraeus Noblelight Limited, UK. In addition, the potential sale of an equity interest in start-up Lumenicity Limited, UK, to the Microsoft Corporation was presented and discussed in detail. The Supervisory Board also received a comprehensive report on plans to split Heraeus Deutschland GmbH & Co. KG into dedicated entities for each individual business unit.

In a letter dated August 19, 2022, the Board of Managing Directors informed the Supervisory Board about problems in the supply chain for sodium hydroxide and hydrochloric acid at Heraeus Precious Metals and reported on the measures that had been implemented to resolve them.

In a letter dated August 29, 2022, the Board of Managing Directors informed the Supervisory Board that the impact of bottlenecks in the supply of sodium hydroxide and hydrochloric acid had been greatly reduced, and explained how this had been achieved.

In a letter dated October 12, 2022, 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 Nexensos GmbH to Yageo Corporation. The sale is expected to be completed in the first half of 2023.

In a letter dated October 14, 2022, the Board of Managing Directors notified the Supervisory Board of the conclusion of an agreement for the sale of the equity interest in start-up Lumenicity Limited, UK, to the Microsoft Corporation.

At an information event on October 19, 2022, the Board of Managing Directors provided updates on the ongoing financial year and progress with current M&A projects. In addition, the information event also addressed prevailing challenges in connection with market trends in China and their implications for Heraeus.

The next update on ongoing M&A projects was provided by the Board of Managing Directors at an information event on December 1, 2022.

At its meeting on December 14, 2022, the Board of Managing Directors reported on the ongoing financial year, strategic topics, and progress with several M&A projects. Moreover, the Board of Managing Directors provided a comprehensive update on the precious metal inventories being maintained for strategic reasons. It also provided a report on sustainability topics in the Group (ESG) and a risk report. The meeting also received a presentation on the Heraeus Group's planning for 2023 to 2025, including the borrowing framework. The planning was reviewed in depth and approved.

At the same meeting, the Supervisory Board passed a resolution to reappoint Mr. Rolf Wetzel as a member of the Board of Managing Directors.

Finally, the report on the review in accordance with the European Market Infrastructure Regulation (EMIR) was presented to the meeting.

Meetings and resolutions of the committees

The Audit Committee of the Supervisory Board held three meetings in 2022 as well as one presentation event in connection with the invitation to tender for the auditing of financial statements of the Heraeus Group beginning with the 2023 annual financial statements.

At its meeting on April 5, 2022, the Audit Committee mainly discussed the single-entity and consolidated financial statements for 2021, including the auditor's key audit points. In addition, the Board of Managing Directors provided a risk management report and presented an overview of portfolio management activities and current M&A projects. The auditors responsible for the audit participated in this meeting. Further topics of discussion included the Group's funding and the 2020 precious metals recycling inventory.

At its meeting on September 23, 2022, the Audit Committee primarily dealt with the Group's 2022 half-year report and with current business performance, and discussed the key areas of focus for the audit of the 2022 annual financial statements. It also received reports on the current status of M&A projects and an update on cyber security.

On December 1, 2022, the Board of Managing Directors invited the Audit Committee to a presentation event for auditing firms that presented their concepts for the tendered engagement for the audit of the consolidated financial statements.

The meeting on December 14, 2022 mainly addressed the ongoing financial year, the responsibility management system, the risk management system, and Group Internal Audit. Other agenda items covered business performance, the status of current M&A projects, and the key areas of audit focus proposed by the auditors for the 2022 consolidated financial statements. In addition, the Audit Committee also discussed the upcoming scheduled tender process for the selection of an independent auditor for the consolidated financial statements and received an update on the selection process. The implementation of changes to the strategic precious metals inventories was also discussed at this meeting.

The Supervisory Board was comprehensively informed of the activities of the Audit Committee at the Supervisory Board meetings following each of these meetings.

Meetings of the Presidial Committee of the Supervisory Board

The Presidial Committee convened two meetings in the reporting year.

On May 11, 2022, the Managing Director employment contract of Dr. Frank Stietz was extended. On December 14, 2022, the Supervisory Board approved the extension of the Managing Director employment contract of Mr. Rolf Wetzel.

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 Heraeus Holding GmbH

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 2022 were audited by Ernst & Young GmbH Wirtschaftsprüfungsgesellschaft, Eschborn, and given an unqualified audit opinion.

The Supervisory Board issued the engagement for these audits at its meeting on April 27, 2022. The shareholders approved the audit engagement at the shareholders' meeting on June 11, 2022.

In addition, the Supervisory Board's Audit Committee discussed the single-entity financial statements of Heraeus Holding GmbH and the consolidated financial statements for 2022, together with the related audits, at its meeting on March 30, 2023. 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 27, 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 2022 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.

Personnel matters relating to the Supervisory Board of Heraeus Holding GmbH

The term of office of Dr. Hubert Lienhard ended on June 11, 2022. Dr. Lienhard stood again as a candidate and was re-elected by the shareholders' meeting for a term of five years, as specified in the articles of association.

Changes to the Board of Management of Heraeus Holding GmbH

Dr. Frank Stietz was reappointed as a member of the Board of Management for a further term of three years from April 1, 2023 until March 31, 2026.

Rolf Wetzel was reappointed for a further term of three years from July 1, 2023 until June 30, 2026.

The Supervisory Board would like to offer special thanks to all members of senior management for their extraordinary commitment, to the works councils of the Heraeus Group for their constructive support with the ongoing development of the Group, and to each and every employee for their hard work and dedication throughout the past year, which was characterized by a whole host of challenges.

Hanau, April 24, 2023
The Supervisory Board

A handwritten signature in blue ink, appearing to read 'F. Haniel', with a stylized initial 'F'.

Franz Haniel
Chairman

Group management report. In 2022, Heraeus exceeded the forecast revenue excluding precious metals. Profit after taxes was also slightly higher than anticipated. This was attributable to systematic 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 was incorporated in 1851 and can trace its roots back to a pharmacy opened by the family in 1660. Today, Heraeus encompasses a large number of businesses that operate in the fields of activity Health, Electronics, Industrials, and Environmental. 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, medical equipment, semiconductors, telecommunications, lighting, chemicals, pharmaceuticals, steel, photovoltaics, and automotive products.

Under the umbrella of Heraeus Holding, the Group's four fields of activity remained unchanged in 2022. In the field of activity Health, Heraeus operates as a provider of components and solutions for medical equipment as well as biomaterials. The field of activity Electronics supplies customers with materials and integrated materials solutions in packaging technology and with high-purity quartz glass. In Industrials, Heraeus provides its customers with measurement equipment for high-temperature processes as well as sensor and electrochemical solutions. This field of activity also includes all the Group's start-up activities. The activities pooled under the field of activity Environmental make a contribution to resource-efficient power generation and product manufacturing. They include products for the photovoltaic industry, specialty light sources for industrial production, and precious metal services and products. The Corporate unit brings together the Group's corporate functions.

Heraeus Holding is responsible for the corporate strategy of the Group, which controls the fields of activity. 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 total revenue, 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. When looking at total revenue, it must be borne in mind that this figure is heavily influenced by the volatility of precious metal prices.

With over 120 companies and more than 15,900 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 1,100 patent families, with property rights in various countries, and employs more than 940 people in research and development (R&D). Its research and development expenditure in 2022 amounted to €155.8 million.

Numerous interdisciplinary and international R&D projects were initiated and progressed last year, aided by a consolidation of R&D activities in the innovation centers. The following sections provide a detailed description of the key activities in the individual fields of activity.

Economic report

Macroeconomic and sector-specific conditions

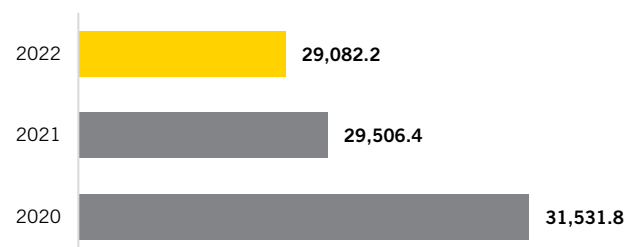
In 2022, the global economy faced a variety of challenges that sparked turmoil. Russia's invasion of Ukraine had a severe economic impact on a global scale and triggered an energy crisis in Europe that weakened economic growth significantly. This downturn was exacerbated by rising inflation and interest rates. In addition, the coronavirus pandemic still lingered and continued to have adverse economic effects, especially in China. Supply chains remained disrupted in some sectors, leading to supply shortages that held back economic growth. As a result, growth forecasts as a whole were cut sharply over the course of 2022. The latest figures published by the International Monetary Fund (IMF) predict that the global economy will have grown by 3.4 percent in 2022 compared with the previous year.

This slowdown in growth reflects the fact that the biggest national economies have weakened considerably. At the level of individual regions and countries, the picture is more mixed. While the US economy grew at a rate of 2.0 percent (2021: 5.9 percent), the eurozone achieved growth of 3.5 percent (2021: 5.3 percent). By contrast, Germany lags behind other countries with a growth rate of 1.9 percent (2021: 2.6 percent). Emerging economies and developing countries recorded a higher level of growth at 3.9 percent but still experienced a slowdown year on year (2021: 6.7 percent). Growth in China slumped to 3.0 percent (2021: 8.4 percent). This was mainly attributable to the lockdowns imposed under Beijing's zero-COVID policy and to the intensifying crisis in the country's real estate sector.

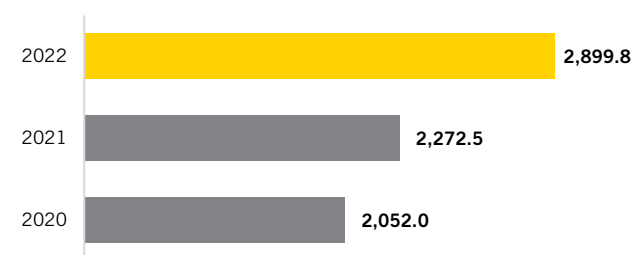
Like most other markets, the sales markets served by Heraeus did not escape the effects of this trend in 2022, although many of them still managed to achieve encouraging growth.

The semiconductor market continued to grow substantially in 2022. Fueled by sustained high levels of investment around the world, chip production increased by 8 percent compared with the previous year. Capital expenditure in semiconductor manufacturing facilities was up by 7 percent year on year. The additional capital expenditure is primarily driven by the currently high levels of demand for industrial electronics.

Total revenue
€ million



Revenue excluding precious metals
€ million

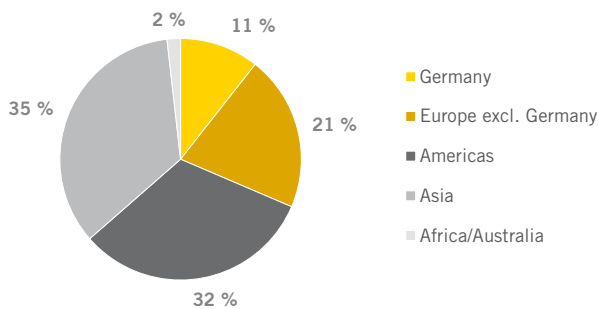


The market for optical fibers for telecommunications and data transmission continued to recover in 2022. Against the backdrop of funding schemes for the expansion of fiber-optic networks to the doorstep ('fiber to the X', FTTx) and the expansion of 5G mobile networks, this market is estimated to have grown by 9 percent year on year.

The photonics business (optics industry focusing on research, medical equipment, and laser technology) grew in 2022 thanks to the positive market conditions in core markets. Growth in the medical business remained strong, but laser applications recorded a slight slowdown compared with the extremely high level of growth in 2021.

Demand for medical solutions picked up further in 2022. In addition to temporary catch-up effects following the peak of the coronavirus pandemic, the market for medical solutions continued to enjoy a tailwind from supertrends in this field. While an aging population and unhealthy lifestyles were partly responsible for rising demand, the introduction of new products and therapies and the growing use of medical equipment in the emerging markets and developing countries were particularly strong drivers.

Revenue excluding precious metals by region 2022

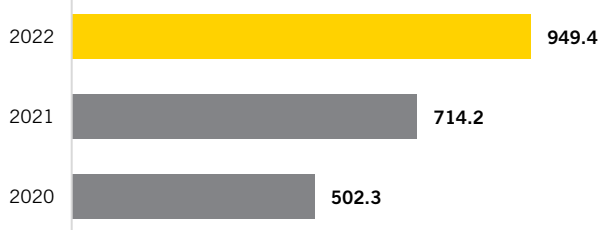


In contrast to the sales markets referred to above, the steel market – which is important for Heraeus – faced major challenges. Demand for steel declined sharply in 2022. Following a rise in 2021 as a result of higher volumes of investment in the construction and capital equipment market, global demand for steel is estimated to have fallen by 2.3 percent in 2022 due to high inflation, rising interest rates around the world, and the slowdown in Chinese economic growth.

Comparison between actual and forecast business performance

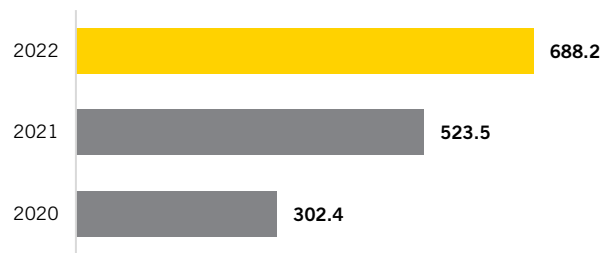
For 2022, it was forecast that revenue would continue to recover. Revenue excluding precious metals was higher than predicted, at €2.9 billion. This represents an improvement of 27.6 percent on the prior year, which was attributable in part to positive exchange rate effects.

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



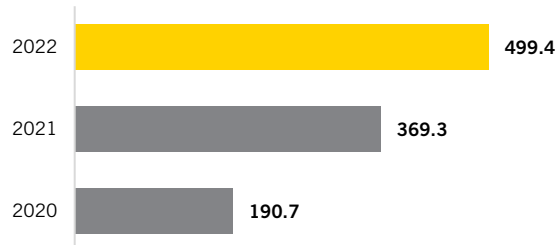
All fields of activity exceeded their forecasts, in some cases by a significant margin. The fields of activity Electronics and Health, in particular, surpassed expectations.

Earnings before interest and tax (EBIT)
€ million



At €499.4 million, the profit after taxes generated in 2022 was also higher than predicted. This was attributable to systematic operational improvements, persistently high market volatility in the precious metal business, and effective cost-reducing measures as well as to the amicable resolution of a long-standing dispute between Heraeus Medical GmbH and Zimmer Biomet Holdings Inc. This dispute was based on an accusation by Heraeus Medical that Zimmer Biomet had illegally exploited trade secrets of Heraeus Medical. The agreement between the parties includes a payment in the low-triple-digit millions to be made by Zimmer Biomet to Heraeus Medical.

Profit after taxes
€ million



Consolidated income statement

€ million	2022	2021	Change
Revenue	29,082.2	29,506.4	- 424.2
Cost of materials incl. change in inventories	- 26,779.3	- 27,533.6	+ 754.3
Personnel expenses	- 1,098.4	- 897.5	- 200.9
Other operating income	210.9	24.0	+ 186.9
Other operating expenses	- 518.7	- 418.5	- 100.2
Impairment results on trade receivables	- 4.5	- 0.8	- 3.7
Income from investments accounted for using the equity method	57.2	34.2	+ 23.0
Earnings before interest, tax, depreciation, amortization, and impairment (EBITDA)	949.4	714.2	235.2
Amortization, depreciation, and impairment	- 261.2	- 190.7	- 70.5
Earnings before interest and tax (EBIT)	688.2	523.5	164.7
Net finance costs	- 10.8	- 27.6	+ 16.8
Profit before taxes (EBT)	677.4	495.9	+ 181.5
Income taxes	- 178.0	- 126.6	- 51.4
Profit after taxes	499.4	369.3	130.1

Business performance, financial position, and financial performance

Total revenue fell from €29.5 billion to €29.1 billion, a decline of 1.4 percent. Revenue excluding precious metals came to €2.9 billion, a year-on-year increase of 27.6 percent, or 21.8 percent adjusted for currency effects.

Asia remained the strongest region in terms of revenue excluding precious metals, accounting for 34.6 percent of the total. Revenue in this region rose by 14.7 percent year on year. A year-on-year increase in revenue excluding precious metals was also reported in Europe (up by 19.7 percent).

Detailed breakdowns of revenue performance in the individual fields of activity are provided in the subsequent sections.

The Group's earnings before interest and tax (EBIT) for the year came to €688.2 million, which was up by €164.7 million on the prior-year figure of €523.5 million.

Despite a decrease in total revenue, Heraeus reported a significant rise in gross profit – the difference between revenue generated and materials consumed (including change in inventories) – due, in particular, to the increase in revenue excluding precious metals. This gross profit figure rose by 16.7 percent year on year to reach €2,302.9 million.

Personnel expenses went up by €200.9 million to €1,098.4 million in the reporting year. This increase was mainly attributable to expenses for acquisitions in December 2021 and in 2022 (up by €101.9 million), negative currency effects of €44.2 million (2021: positive currency effects of €6.4 million), and higher expenses for bonus payments (up by €28.5 million).

Depreciation, amortization and impairment amounted to €261.2 million, an increase of €70.5 million compared with the previous year. This figure included impairment losses of €45.4 million (2021: €27.7 million), which mainly related to impaired technical equipment and office furniture and equipment that could no longer be used as planned. In addition, the acquisitions made at the end of December 2021 contributed €45.1 million to depreciation, amortization, and impairment expenses.

Other operating income rose by €186.9 million year on year to €210.9 million. Included in this figure is income of €137.5 million from an amicable settlement agreement resolving a long-standing legal dispute, income from the reversal of provisions in an amount of €20.9 million (2021: €3.2 million), and foreign currency gains of €9.5 million (2021: €0.0 million). Impairment gains (+)/losses (-) on trade receivables came to €- 4.5 million in the reporting year (2021: €- 0.8 million) due to a slight increase in risk provisioning.

Consolidated balance sheet

€ million	Dec. 31, 2022	Dec. 31, 2021	Change
Non-current assets	3,127.2	3,022.8	+ 104.4
Current assets	4,001.7	3,970.7	+ 31.0
Total assets	7,128.9	6,993.5	+ 135.4
Shareholders' equity	4,532.5	3,801.4	+ 731.1
Non-current liabilities	1,207.4	926.3	+ 281.1
Current liabilities	1,389.0	2,265.8	- 876.8
Total shareholders' equity and liabilities	7,128.9	6,993.5	+ 135.4

Other operating expenses went up by €100.2 million to €518.7 million in the reporting year. The increase was mainly attributable to higher expenses for maintenance (up by €30.8 million) and external services (up by €19.5 million), as well as higher travel costs (up by €12.7 million) and freight costs (up by €12.2 million).

The contribution from associates to earnings before interest and tax rose by €23.0 million to €57.2 million (2021: €34.2 million). The increase was largely attributable to a higher contribution from the associate in Japan.

Net finance costs improved by a substantial €16.8 million year on year to €- 10.8 million. This was mainly attributable to income of €25.5 million from the disposal of a miscellaneous investment, while a countervailing impairment loss of €2.5 million was recognized on another miscellaneous investment.

Profit before taxes came to €677.4 million, an increase of €181.5 million compared with the previous year. The tax rate edged up from 25.5 percent in 2021 to 26.3 percent for the reporting year.

Profit after taxes amounted to €499.4 million in 2022 (2021: €369.3 million).

The Heraeus Group's financial position was further consolidated in 2022. Heraeus continues to have a very healthy balance sheet, hold a substantial cash balance, and benefit from a secure medium and long-term funding base. At the end of 2022, the Heraeus Group's total assets amounted to €7,128.9 million, a year-on-year increase of €135.4 million. The Group's equity ratio was higher than in the previous year at 63,6 percent (2021: 54.4 percent).

Non-current assets increased by €104.4 million year on year to €3,127.2 million. The company invested €287.7 million in property, plant, and equipment, and intangible assets. Depreciation/amortization and impairment losses amounted to €232.8 million. Other financial assets increased by €43.3 million, mainly due to long-term receivables in connection with a settlement agreement resolving a long-standing legal dispute. A decline in deferred tax assets of €59.8 million to €116.8 million had a countervailing effect.

Current assets went up by €31.0 million year on year to €4,001.7 million. This reflects, in particular, a €258.2 million decline in receivables from precious metal swaps. By contrast, cash and cash equivalents increased by €284.6 million.

Non-current liabilities were up by €281.1 million compared with the prior-year balance sheet date, at €1,207.4 million. Pensions and similar obligations fell by €240.2 million year on year, mainly as a result of the increased discount rates. Non-current financial debt increased by €491.3 million to €674.0 million, primarily in connection with long-term financing solutions for the acquisitions made at the end of 2021. A bond issue with a volume of €500 million and a term to maturity until 2027 was placed. Deferred tax liabilities went up by €29.1 million year on year.

Current liabilities reduced by €876.8 million to €1,389.0 million. Current financial debt fell by €532.1 million to €65.4 million, mainly as a result of the long-term financing solutions arranged in 2022 for the acquisitions made in 2021. Liabilities from precious metal swaps declined by €346.3 million.

Consolidated cash flow statement

€ million	2022	2021	Change
Net cash provided by operating activities	692.1	607.9	+ 84.2
Net cash used for investing activities	- 261.8	- 1,194.3	+ 932.5
Net cash provided by / used for financing activities	- 140.8	371.6	- 512.4
Net change in cash and cash equivalents	289.5	- 214.8	+ 504.3

The Group funds itself centrally via the Corporate Treasury function of Heraeus Holding GmbH. 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 primarily 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 and a long-term, committed syndicated loan facility. Neither of these instruments had been utilized at the end of 2022. The Trading units also use precious metal leasing for short-term funding. At the end of 2021, the total market value of the precious metals on loan from third parties amounted to €1,767.0 million (2021: €1,902 million).

The net cash provided by operating activities amounted to €692.1 million in the reporting year, compared with €607.9 million in 2021. The main contributory factors were profit after taxes of €499.4 million and the non-cash balance from amortization, depreciation, impairment, and reversal of impairment in the amount of €250.3 million. After adjusting for acquisitions and non-cash currency effects, trade payables had risen year on year by €89.1 million and inventories by €15.7 million as of December 31, 2022. Conversely, trade receivables fell by €79.0 million. The change in other net assets amounting to €310.8 million is largely attributable to a fall of €123.1 million in liabilities from precious metal trading contracts, receivables of €106.2 million from a settlement agreement resolving long-standing legal disputes, and a €74.7 million decline in the net balance of receivables and liabilities from precious metal swaps.

The net cash used for investing activities of €261.8 million mainly comprised payments for investments in non-current assets (€305.5 million), payments for acquisition of equity-accounted entities (€13.9 million), and payments for acquisitions after deduction of acquired liquid assets (€9.0 million). Countervailing cash flows largely consisted of receipts from disposals of miscellaneous investments (€33.7 million) and interest received of €26.9 million.

Net cash used for financing activities of €140.8 million mainly comprised proceeds from the issuing of interest-

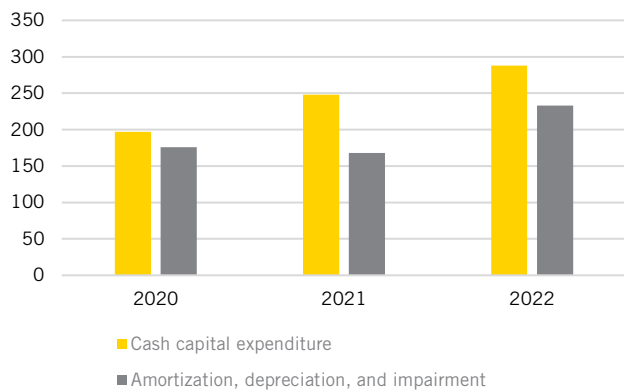
bearing liabilities (€499.6 million) and payments relating to the redemption of interest-bearing liabilities (€546.0 million). In addition, distributions totaling €45.1 million and interest payments totaling €49.8 million were made.

Consequently, there was a rise in cash and cash equivalents of €289.5 million. For further analysis, please refer to the cash flow statement in the notes to the consolidated financial statements.

The Group's liquidity reserves (cash and cash equivalents) increased by a total of €284.6 million to €934.5 million, mainly as a result of the positive business performance. This means that the Group's financial position remains very 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 2022 was very 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 2022, Heraeus recognized additions to property, plant, and equipment and intangible assets of €287.7 million (2021: €248.4 million). In addition, there were purchase

commitments of €86.7 million at the year-end that can be met using the available cash and cash equivalents.

Further good 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, other expansion projects – particularly in the USA and Asia – were completed.

The acquisition of Switzerland-based Erbas SA strengthened the field of activity Environmental. Erbas SA specializes in precision mechanics and watch-making. The company also strengthened its position in the steel industry by purchasing the remaining shares in Shree Ram Measurement Technologies Private Ltd., New Delhi, India.

In 2022, Heraeus concluded an agreement with international electronics specialist Yageo (Taiwan) for the sale of the sensors business involving platinum thin-film technology. The sensors business is based in Kleinostheim. It operates an additional production site in Malaysia as well as sales units in the US, China, and other South East Asian countries, and employs around 480 people. The sale is expected to be completed in the first half of 2023.

Field of activity Health

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 business began as a pharmacy. Today, Heraeus is one of the leading manufacturers of orthopedic products, particularly biomaterials. It is also a key supplier in the areas of cardiology, neurology, and minimally invasive surgery. Since the end of 2021, the field of activity has included an additional unit that focuses on the manufacture of medical products for minimally invasive, robotics-assisted, and orthopedic surgery.

Business performance

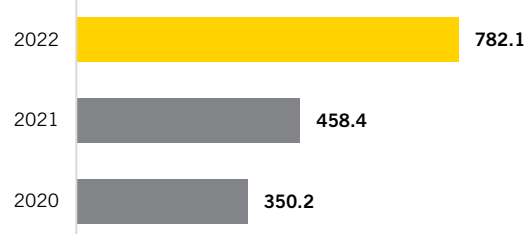
The field of activity Health recovered strongly in 2022, having been severely affected by the coronavirus pandemic in 2021. As a result of this recovery and the acquisition of a new business, revenue excluding precious metals increased by 70.6 percent year on year to reach €782.1 million.

The **Biomaterials** business generated strong revenue growth in spite of pandemic-related restrictions and disrupted supply chains. New products were launched in this area last year, providing further positive impetus. Legal disputes with the competitor Zimmer Biomet that had been ongoing for several years were resolved amicably in 2022 without either party accepting liability. The business received a substantial payment as part of this amicable settlement.

The **medical components and solutions** business also benefited from global market growth due to catch-up effects after the coronavirus pandemic and a normalization of the number of patients, seeing a sharp increase in revenue. Moreover, additional market share was gained from key competitors. The ramp-up of new product launches, positive currency effects, and high precious metal prices also delivered substantial contributions to revenue growth in this business.

The main factors influencing growth in the business for **medical components for surgery** were price increases, higher sales volumes, and launches of new products.

Revenue excluding precious metals | Field of activity Health
€ 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. In addition, the focus on external product development and development partnerships was sharpened with the aim of further expanding the product portfolio.

In the **medical components and solutions** business, research into neuromodulation leads and solutions and minimally invasive delivery systems was continued.

New products were also brought to market in the business with **medical components for surgery**.

Field of activity Electronics

Digitalization and interconnectedness are proceeding apace around the globe and have become a key element of today's society. Heraeus supports customers from the information technology, automotive, telecommunications, and consumer goods industries in making electronic components smaller, longer lasting, and more efficient by offering a broad range of innovative joining and coating technology solutions that are available around the world. Its in-depth materials expertise and its broad technology portfolio allow 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.

Business performance

Revenue excluding precious metals in the Electronics business rose by 29.2 percent to €686.6 million in 2022. The positive performance was mainly driven by increased investing activities in the semiconductor industry, strong demand in the optical fiber business, and growth across all photonics applications and in electric-powered transport.

Unit sales in the **joining and coating technology** business were encouraging in 2022. Strong demand, driven mainly by the electric vehicle industry and the semiconductor industry in the first half of the year, led to a sharp rise in revenue in this segment. In addition to the healthy business with established products, new designs also generated positive momentum.

Robust revenue growth in the **semiconductor applications** business was achieved thanks to high capacity utilization and increased investment activity by the semiconductor industry. The revenue growth was also supported by increased demand in the photonic applications business. The higher level of demand for photonic applications was attributable to the positive market environment with solid growth in core markets and in the medical sector.

Increased demand for optical fibers for telecommunications in 2022 fueled interest in Heraeus products. Global demand in the optical fibers business recovered in 2022 and climbed above the previous high from 2018. Assuming that data transmission volumes continue to grow, the expansion of 5G mobile networks will further boost demand for optical fibers compared with 4G networks.

Revenue excluding precious metals | Field of activity
Electronics
€ million



Research and development

Heraeus is continuously looking for new solutions and products in the **joining and coatings technology** business that will enable it to continue to meet increasingly challenging customer requirements for cost-efficiency and performance in the future. Special focus areas of research and development in this business include fine pitch solder pastes and sinter materials for the sintering of modules on heat sinks. The joining and coatings business is also working on improvements to Die Top System (DTS®), its materials system solution.

A key focus area of research and development activities for the **semiconductor applications** business in 2022 was expanding the product portfolio and processing expertise so that the business could satisfy the ever-increasing customer requirements regarding material properties and performance. With this in mind, even greater efforts were devoted to development activity in the areas of extreme ultraviolet (EUV), synthetic quartz glass, and functional materials. The aim is to be able to offer products that stand out for their even higher levels of precision and purity while also featuring specifically targeted material properties.

The focus of the **glass for telecommunication fibers** business in 2022 was firmly 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.

Field of activity Industrials

Heraeus has long been a partner of choice for industry, based on the Group's in-depth expertise in high-temperature processes and in various sensor applications. Heraeus 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 field of activity Industrials also includes start-up activities, sensors, and electronic chemicals.

Business performance

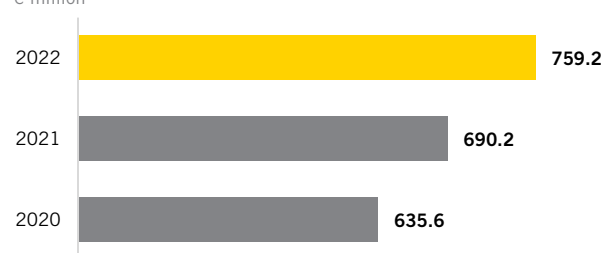
Within the field of activity Industrials, revenue excluding precious metals rose by a substantial 10.0 percent in 2022 to reach €759.2 million.

In the **steel business**, a decline in steel production in 2022 led to weaker demand for sensors and instruments that improve steel production processes. Prices in this business were raised to offset higher costs for materials, energy, shipping, and wages. Along with exchange rate effects, these higher prices helped the measurement equipment business to achieve revenue growth in spite of falling demand.

The **sensors** business saw a slowdown in demand from vehicle manufacturers due to the microchip crisis and bottlenecks in the supply of components. However, strong demand in the industrial segment, especially from China and other East Asian countries, meant that revenue in this business still increased slightly compared with the previous year.

The **electronic chemicals** business once again generated robust revenue growth in the segments for capacitor technology and photoresist chemicals.

Revenue excluding precious metals | Field of activity Industrials
€ million



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.

In the **sensors** business, Heraeus intensified efforts to further develop the existing product portfolio, especially in the areas of industrial and electric transport applications. The development of smaller component sizes was also an area of focus.

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

Existing fields of work of the **start-ups** included improving the performance of lithium-ion batteries, the processing of special alloys, the manufacture of amorphous metal alloys, research into and the development of comprehensive solutions for electromagnetic interference (EMI shielding), innovative coating technologies, and solutions for the recycling of rare earths. In addition, Heraeus also focused on medical glass, specialty glass, and wound care technologies in connection with new acquisitions made in 2021.

Field of activity Environmental

The development of sustainable technologies for a clean environment represents one of the key activities at Heraeus. With its photovoltaics products, the company makes a significant contribution to resource-efficient power generation. Another key activity of Heraeus is the manufacturing of specialty light sources to purify air and water, a resource that is becoming ever scarcer. As a precious metal specialist, the company has extensive expertise in the manufacturing of industrial products containing precious metals for various applications. Heraeus 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 and in industrial products in the field of activity Environmental.

Business performance

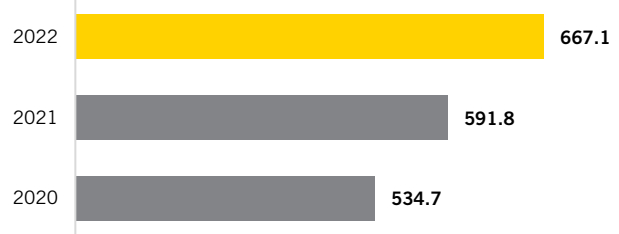
Revenue excluding precious metals in the field of activity Environmental rose substantially in 2022. Compared with the previous year, this key figure increased by 12.7 percent year on year to €667.1 million.

The business with **silver conductive pastes** for solar cells saw a slump in demand which ultimately translated into a sharp decline in revenue in 2022. The main factors eroding demand were delays in product development and a challenging competitive environment. In addition, the raw material price of polycrystalline silicon remained high, which had a negative impact on demand for photovoltaic solutions.

The **specialty light sources** business benefited from healthy levels of demand in most end markets last year and thus achieved a substantial increase in revenue. Rising costs, especially for materials, energy, and logistics, were passed on to customers through price increases and thus offset successfully for the most part.

As one of the leading suppliers of precious metals services and products, Heraeus significantly improved its revenue from the **precious metal solutions** business once again in 2022. A continuation of extremely high levels of volatility and high precious metal prices resulted in substantial contributions to earnings. In addition, the proportion of higher-margin products was increased in this business.

Revenue excluding precious metals | Field of activity Environmental
€ million



Research and development

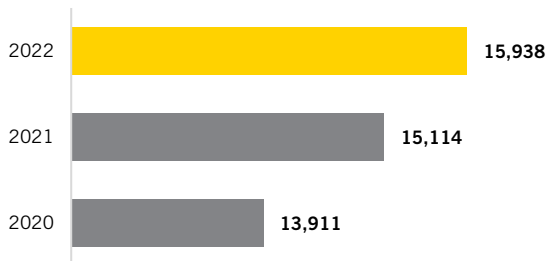
The business focusing on **silver conductive pastes** for solar cells continues to work on developing new products for cutting-edge manufacturing technologies such as TopCon and heterojunction technology (HJT) and conducting research into technologies and materials that may enhance the efficiency of silver conductive pastes.

The **specialty light sources** business brought new LED products to the market in the reporting year. In addition, the business is working on the further development of microwave technology. A number of products are currently at testing stage. The portfolio of flashlights was also expanded. Most notably, new systems were added for composite manufacturing and disinfection systems.

In 2022, the **precious metal solutions** business conducted research into new catalysis products for hydrogen-fueled transport and the development of new processes for the recycling of complex materials. In addition to these fields of research and development, which will also be pursued in the future, the authentication and traceability of precious metals is a key research area in this business.

People at Heraeus

Number of employees worldwide



Overview: number of employees

As of December 31, 2022, Heraeus had 15,938 employees worldwide (2021:15,114).

The rise in headcount resulted mostly from a growth-driven expansion of production capacity in several business units of Heraeus. Following the reorganization of central corporate functions, more jobs were transferred to the newly founded entities.

Since the start of 2022, the central HR, Marketing & Communications, Group Procurement, Environment, Health & Safety (EHS), Finance, and Legal & Responsibility functions have been combined into Heraeus Business Solutions (HBS). HBS uses its expertise to support the operating businesses, the holding company, and the service platforms as an internal advisor and service provider in the different fields of competence.

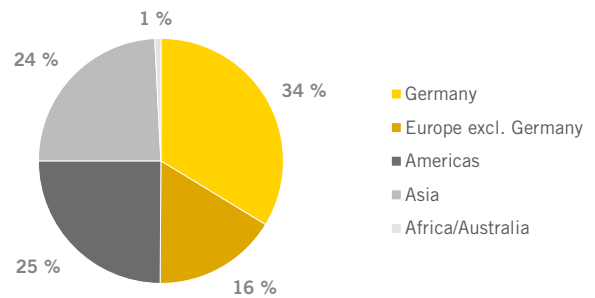
Heraeus Consulting & IT Solutions (HCS), which comprises Heraeus IT (HIT), the Heraeus Digital Hub (HDH) and the Excellence team, was also launched on January 1, 2022. This new entity will further develop the central Heraeus IT systems and will continue to support the businesses on a project basis in the areas of digitalization and achieving excellence.

Heraeus Training and Heraeus Medical Services (HMD) were combined into the dedicated entity Heraeus Health & Education Services (HHE) with effect from November 1, 2022.

New work: the road to a new workplace reality

Although the coronavirus pandemic still lingered in 2022, employees in the administrative functions increasingly returned to the office for work. Much like in production, this shift back was supported with safety measures and precautions at national, regional, and local level.

Employees by region in 2022



However, the working environment has changed compared with pre-pandemic times. Hybrid working models have been adopted for most types of clerical work. Against this backdrop, Heraeus continued to invest in virtual collaboration tools. The rollout of Microsoft Teams at Heraeus unlocks a wide range of opportunities to strengthen modern digital communication.

Moreover, the third instalment of the Heraeus Virtual Week – a digital training program for employees around the world – was hosted in 2022. The Heraeus Prevention Days could unfortunately not be held in their usual format as an in-person event last year but were transformed into a digital event by Heraeus Medical Services.

Heraeus helps: donations for Ukraine from the company and its employees

The plight of Ukraine has moved everyone at Heraeus profoundly. The military aggression that has led to this humanitarian disaster contravenes the core values that Heraeus has championed for decades: democracy, freedom, understanding among peoples and cultures, openness, and tolerance.

Heraeus stands in solidarity with the people of Ukraine. As a means of turning this sentiment into action, Heraeus Holding decided to support the Ukrainian population with donations. An 'Aktion Deutschland Hilft' fundraising account was set up for this purpose and Heraeus agreed to match all donations made by its employees like for like. In total, more than €300,000 was raised through this initiative. Moreover, Heraeus made €100,000 in instant aid available to various aid organizations and supported colleagues and their families who had fled Ukraine.

Outlook

Heraeus expects its sales markets to perform robustly in 2023, although geopolitical and macroeconomic factors will give rise to significant uncertainty.

The latest forecast published by the International Monetary Fund (IMF) predicts global economic growth to weaken from 3.4 percent in 2022 to 2.9 percent in 2023. Economic conditions in individual countries in 2023 will be influenced by general macroeconomic factors such as rising inflation, as well as by the future trajectory of Russia's invasion of Ukraine and potential further pandemic-related turmoil or supply chain disruptions. The IMF forecasts that growth in the three biggest economies – the US, the EU, and China – will stagnate. For the US, the IMF projects growth of 1.4 percent for 2023 (2022: 2.0 percent). The world's biggest economy is thus predicted to fare better than the eurozone, which is expected to see GDP growth of 0.7 percent (2022: 3.5 percent). The IMF's forecast for Germany is growth of 0.1 percent (2022: 1.9 percent), while China's economy is expected to recover and grow by 5.2 percent (2022: 3.0 percent). The economies of emerging markets and developing countries are predicted to grow by 4.0 percent on average (2022: 3.9 percent).

The current growth forecasts continue to be subject to considerable uncertainty. Restricted production, supply chain disruption, and supply shortages as a result of measures to contain the pandemic still remain a possibility that cannot be ruled out for 2023. In addition, growth and demand may be very sensitive to negative impacts from high inflation around the world and Russia's invasion of Ukraine.

Heraeus forecasts moderate growth in revenue excluding precious metals for 2023.

In the field of activity **Health**, Heraeus anticipates strong revenue growth in 2023 following a robust recovery in 2022. It is expected that the market will continue to grow, although staff shortages may still impede a return to normality in the operation of hospitals. Heraeus intends to further strengthen its market position and reap rewards from new product launches.

Heraeus predicts that revenue will continue to grow strongly in the field of activity **Electronics**. Key technologies such as EUV lithography in the semiconductor industry, high-purity quartz glass for optical applications, and a new ceramics production line for the semiconductor industry will all contribute to revenue growth in this business. Moreover, it is expected that electric-powered transport and new energies will provide positive stimulus for demand in the field of activity Electronics. In the glass for telecommunications fibers business, the volume of investment in the market is

expected to rise in the coming year, which should result in higher demand and, consequently, strong revenue growth.

In the field of activity **Industrials**, future business performance is primarily determined by global steel production. The World Steel Association (WSA) expects demand for steel to recover by 1 percent in 2023, but has emphasized that this outlook is highly dependent on future action taken by the central banks in their bid to control inflation. Heraeus believes that the performance of its business with sensors for steel production will be supported not only by the recovery in demand for steel but also by new solutions for measurements and sampling of molten metals. In the electronic chemicals business, growth is expected to slow down in the consumer electronics and semiconductor markets. However, demand for automotive electronics and communications technology should remain robust.

For the field of activity **Environmental**, Heraeus anticipates a moderate rise in revenue in 2023. Heraeus believes that the situation in the precious metal markets will gradually normalize. The outlook for the product segments remains positive. Demand in the silver conductive pastes business is expected to grow, while new products and improved cost management should further contribute to revenue growth. Revenue in the Specialty Light Sources business is also expected to go up. However, rising costs will require continued disciplined cost management.

Heraeus anticipates a strong fall in profit after taxes for 2023 compared with 2022. This decline is expected to be driven primarily by the return to normality in the precious metal markets and the fact that the 2022 result was boosted by a positive one-off item in the form of the settlement payment from Zimmer Biomet in the field of activity Health. The excellence initiatives implemented in past years will continue to have a positive impact.

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 by their potential impact on the Group. The structure of the report is based on these categories.

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 plays a key role in the sharing of knowledge and experience with start-ups. The focus areas of this program in 2022 were 'digitalization' and 'medical solutions'. The R&D activities within the various fields of activity 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 fields of activity 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

While the pandemic-related restrictions were lifted for the most part, allowing life to return to normal, different new trends such as rising inflation and soaring energy prices had a negative impact on the economic environment in 2022.

Heraeus generally achieved encouraging revenue and profit growth in the reporting year. High demand, especially in the electric vehicle and semiconductor industries, was a crucial positive performance driver. The biomaterials and medical components businesses also benefited from global market growth due to catch-up effects after the coronavirus pandemic and the normalization of the number of patients.

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. It 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 the coronavirus pandemic, 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 market positioning and protect its 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 fields of activity and alternative products are developed to counter the potential loss of market shares.

A possible acceleration in the expansion of the 5G and optical fiber networks and growing demand for innovative fibers represent sources of opportunity for the field of activity Electronics. A more rapid and widespread switch to electric vehicles and increasing demand for semiconductors would also have a positive effect on demand in this field of activity. On the other hand, demand could be dampened by rising energy costs and high inflation.

Opportunities for the field of activity Health 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.

In the field of activity Industrials, future business performance is primarily determined by global steel production. Following a downturn in demand in 2022, the World Steel Association (WSA) forecasts a recovery of 1 percent in the demand for steel for 2023. However, inflation risks and rising costs for materials and energy could still lead to a decline in demand for Heraeus products.

In the field of activity Environmental, additional sales opportunities may be unlocked through capacity expansion. Sustainability-related efforts hold market opportunities for Heraeus in a variety of end-customer markets. However, it cannot be ruled out that changes in the macroeconomic environment might cause demand from the plant engineering sector to slump or competitive pressure in this field of activity to intensify further.

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. Moreover, Heraeus has reduced the risks to business processes that could potentially be caused by individual employees contracting coronavirus through the introduction of strict hygiene protocols, the widespread provision of vaccinations and testing, and the comprehensive use of shift systems and mobile working solutions.

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.

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. 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.

For a more in-depth analysis of the financial risks, see notes (38) to (42) of the notes to the consolidated financial statements.

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. Overall, the endangerment of employees or third parties and potential breaches of environmental regulations 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 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. Despite the measures put in place, such as project-specific searches for property rights, 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 purification of water or air or 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. Moreover, risks of this nature may arise as a result of restrictions to production, supply chain disruption, or supply shortages due to pandemic containment measures.

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 are permitted to conduct precious metal transactions solely on the basis of a physical underlying customer transaction. 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. Heraeus regards precious metal trading risks as being low overall.

Commonly used hedging instruments are employed to hedge price risks. 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.

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 2022, Compliance focused on reviewing and, where necessary, adapting the compliance policy, preparing for the implementation of the German Supply Chain Due Diligence Act (LkSG) and the German Whistleblower Protection Act (HinSchG) (still awaited), and reviewing the compliance governance structures under the umbrella of the newly founded Heraeus Business Solutions GmbH.

Specific data protection challenges arose in 2022 from the implementation of the requirements established by the 'Schrems II' decision of the European Court of Justice and from the introduction of a new concept for intercompany agreements. In addition, data protection structures were adjusted in order to reflect the fact that, by virtue of the transfer of HR and marketing matters to the operating businesses, the responsibility for processes that are deemed important from a data protection perspective no longer lies with Heraeus Holding GmbH but has been transferred to the operating businesses.

With regard to export controls and customs, the adjustment to embargoes imposed by the US and the EU in response to Russia's invasion of Ukraine posed the greatest 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 2022 remained on working together to manage the coronavirus pandemic. 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.

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 €7.1 billion as of the end of 2022. Revenue excluding precious metals rose to €2.3 billion. Profit after taxes rose to a new record high of €499.4 million in the reporting year, boosted by positive non-recurring items. Earnings before interest and tax (EBIT) increased substantially year on year to €688.2 million. As of December 31, 2022, Heraeus had 15,938 employees worldwide.

Consolidated balance sheet

of Heraeus Holding GmbH, Hanau, for the year ended December 31, 2022

€ million	Note	Dec. 31, 2022	Dec. 31, 2021
Goodwill	(10)	527.4	500.4
Other intangible assets	(10)	519.4	535.0
Property, plant, and equipment	(11)	1,608.7	1,517.9
Investments accounted for using the equity method	(12)	256.2	244.5
Other financial assets	(13)	89.0	45.7
Deferred tax assets	(33)	116.8	176.6
Other assets	(14)	9.7	2.7
Non-current assets		3,127.2	3,022.8
Precious metals	(15)	1,162.7	1,256.0
Inventories – excluding precious metals	(15)	662.7	566.1
Trade receivables	(16)	759.8	850.6
Cash and cash equivalents	(17)	934.5	649.9
Other financial assets	(13)	158.2	365.3
Income tax assets		26.8	69.4
Other assets	(14)	219.2	213.4
Assets held for sale	(9)	77.8	–
Current assets		4,001.7	3,970.7
Assets		7,128.9	6,993.5

€ million	Note	Dec. 31, 2022	Dec. 31, 2021
Subscribed capital		210.0	210.0
Capital reserve		127.8	127.8
Retained earnings		3,913.9	3,300.5
Other reserves		248.8	140.8
Treasury shares		- 7.7	- 8.2
Equity attributable to the shareholders of Heraeus Holding GmbH	(18)	4,492.8	3,770.9
Non-controlling interests	(19)	39.7	30.5
Shareholders' equity		4,532.5	3,801.4
Pensions and similar obligations	(21)	325.8	566.0
Provisions	(22)	45.1	46.0
Financial debt	(23)	674.0	182.7
Other financial liabilities	(24)	14.2	11.0
Deferred tax liabilities	(33)	134.5	105.4
Other liabilities	(25)	13.8	15.2
Non-current liabilities		1,207.4	926.3
Provisions	(22)	176.6	156.3
Financial debt	(23)	65.4	597.5
Trade payables	(26)	493.4	400.5
Other financial liabilities	(24)	249.5	598.8
Income tax liabilities		41.6	27.3
Other liabilities	(25)	340.0	485.4
Liabilities directly associated with assets held for sale	(9)	22.5	-
Current liabilities		1,389.0	2,265.8
Shareholders' equity and liabilities		7,128.9	6,993.5

Consolidated income statement

of Heraeus Holding GmbH, Hanau, for the period January 1 to December 31, 2022

€ million	Note	2022	2021
Revenue	(27)	29,082.2	29,506.4
Change in inventories		30.9	37.8
Cost of materials		- 26,810.2	- 27,571.4
Personnel expenses	(28)	- 1,098.4	- 897.5
Amortization, depreciation, and impairment	(29)	- 261.2	- 190.7
Other operating income	(30)	210.9	24.0
Other operating expenses	(31)	- 518.7	- 418.5
Impairment gains (+)/losses (-) on trade receivables	(16)	- 4.5	- 0.8
Income from investments accounted for using the equity method	(12)	57.2	34.2
Earnings before interest and tax (EBIT)		688.2	523.5
Finance income	(32)	46.2	23.8
Finance costs	(32)	- 57.0	- 51.4
Net finance costs		- 10.8	- 27.6
Profit before taxes		677.4	495.9
Income taxes	(33)	- 178.0	- 126.6
Profit after taxes		499.4	369.3
<i>thereof attributable to the shareholders of Heraeus Holding GmbH</i>		<i>489.0</i>	<i>360.9</i>
<i>thereof attributable to non-controlling interests</i>	(19)	<i>10.4</i>	<i>8.4</i>

Consolidated statement of comprehensive income

of Heraeus Holding GmbH, Hanau, for the period January 1 to December 31, 2022

€ million	Note	2022			2021		
		Amount before taxes	Tax expense/income	Amount after taxes	Amount before taxes	Tax expense/income	Amount after taxes
Profit after taxes		677.4	- 178.0	499.4	495.9	- 126.6	369.3
Items that will not be reclassified to profit or loss							
Remeasurement of net liability arising from defined benefit pension plans	(21)	223.5	- 54.0	169.5	69.3	3.9	73.2
Items that have been or can be reclassified to profit or loss							
Currency translation adjustment		91.4	-	91.4	130.3	-	130.3
Share of other comprehensive income of investments accounted for using the equity method		- 9.8	-	- 9.8	- 1.2	-	- 1.2
Effective portion of changes in fair value of cash flow hedges	(39a)	32.5	- 9.5	23.0	- 4.1	1.3	- 2.8
Cash flow hedges reclassified to profit or loss	(39a)	3.2	- 1.0	2.2	- 2.2	0.7	- 1.5
Other comprehensive income		340.8	- 64.5	276.3	192.1	5.9	198.0
Total comprehensive income		1,018.2	- 242.5	775.7	688.0	- 120.7	567.3
<i>thereof attributable to the shareholders of Heraeus Holding GmbH</i>				<i>766.5</i>			<i>555.9</i>
<i>thereof attributable to non-controlling interests</i>				<i>9.2</i>			<i>11.4</i>

Consolidated cash flow statement

of Heraeus Holding GmbH, Hanau, for the period January 1 to December 31, 2022

€ million	Note	2022	2021
Profit after taxes		499.4	369.3
Amortization, depreciation, impairment, and reversal of impairment of non-current assets	(10) (11)	250.3	188.8
Net finance costs	(32)	10.8	27.6
Distributions received from associates and joint ventures		50.3	11.4
Change in inventories		- 15.7	34.2
Change in trade receivables		79.0	56.0
Change in trade payables		89.1	- 73.6
Change in provisions and in pensions and similar obligations		- 4.1	- 31.4
Change in other net assets		- 310.8	- 23.5
Other non-cash transactions and other non-operating expenses		41.5	45.4
Gains on disposal of property, plant, and equipment		2.3	3.7
Net cash provided by operating activities	(34)	692.1	607.9
Proceeds from the disposal of non-current assets		2.5	1.8
Payments for investments in non-current assets		- 305.5	- 248.4
Payments for business combinations net of cash and cash equivalents acquired		- 9.0	- 909.4
Proceeds from the disposal of other investments		33.7	-
Payments for the acquisition of entities accounted for using the equity method		- 13.9	- 50.6
Payments for the acquisition of other investments		- 0.5	- 6.8
Payments for the acquisition of other financial assets		- 2.0	- 2.3
Other cash proceeds		6.0	-
Payments for loans to associates		-	- 1.7
Interest received		26.9	23.1
Net cash used for investing activities	(35)	- 261.8	- 1,194.3
Proceeds from the disposal of treasury shares		0.5	-
Distributions, including distributions to non-controlling interests		- 45.1	- 46.1
Interest paid		- 49.8	- 42.7
Proceeds from the issuing of interest-bearing liabilities		499.6	501.3
Payments relating to the redemption of interest-bearing liabilities		- 546.0	- 40.9
Net cash used for / provided by financing activities	(36)	- 140.8	371.6
Net change in cash and cash equivalents		289.5	- 214.8
Effect of exchange rate differences on cash and cash equivalents		- 2.5	11.1
Cash and cash equivalents at the beginning of the period		649.9	853.6
Cash and cash equivalents at the end of the period	(37)	936.9	649.9
<i>thereof cash and cash equivalents held for sale</i>		<i>- 2.4</i>	<i>-</i>

Consolidated statement of changes in shareholders' equity

of Heraeus Holding GmbH, Hanau, for the period January 1 to December 31, 2022

€ million	Note	Subscribed capital	Capital reserve	Retained earnings		Other reserves			Equity attributable to the shareholders of Heraeus Holding GmbH	Non-controlling interests	Shareholders' equity
				Other retained earnings	Remeasurement of defined benefit pension plans	Currency translation	Cash flow hedges	Treasury shares			
									(19)		
Shareholders' equity as of Jan. 1, 2021		210.0	127.8	3,196.5	- 289.2	17.5	1.5	- 8.2	3,255.9	24.3	3,280.2
Profit after taxes, 2021		-	-	360.9	-	-	-	-	360.9	8.4	369.3
Remeasurements of defined benefit pension plans	(21)	-	-	-	73.2	-	-	-	73.2	-	73.2
Currency translation		-	-	-	-	127.3	-	-	127.3	3.0	130.3
Share of income from investments accounted for using the equity method		-	-	-	-	- 1.2	-	-	- 1.2	-	- 1.2
Cash flow hedges	(39a)	-	-	-	-	-	- 4.3	-	- 4.3	-	- 4.3
Other comprehensive income for 2021		-	-	-	73.2	126.1	- 4.3	-	195.0	3.0	198.0
Total comprehensive income for 2021		-	-	360.9	73.2	126.1	- 4.3	-	555.9	11.4	567.3
Distributions	(36)	-	-	- 40.9	-	-	-	-	- 40.9	- 5.2	- 46.1
Shareholders' equity as of Dec. 31, 2021		210.0	127.8	3,516.5	- 216.0	143.6	- 2.8	- 8.2	3,770.9	30.5	3,801.4
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
Profit after taxes, 2022		-	-	489.0	-	-	-	-	489.0	10.4	499.4
Remeasurements 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		-	-	489.0	169.5	82.8	25.2	-	766.5	9.2	775.7
Distributions	(36)	-	-	- 45.1	-	-	-	-	- 45.1	-	- 45.1
Disposal of treasury shares	(18)	-	-	-	-	-	-	0.5	0.5	-	0.5
Shareholders' equity as of Dec. 31, 2022		210.0	127.8	3,960.4	- 46.5	226.4	22.4	- 7.7	4,492.8	39.7	4,532.5

Notes to the consolidated financial statements

of Heraeus Holding GmbH, Hanau, for the year ended December 31, 2022

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 2022 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, 2022 and ended on December 31, 2022. The corresponding prior-year period was January 1, 2021 to December 31, 2021. 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 10, 2023, the consolidated financial statements of Heraeus Holding GmbH for the financial year from January 1, 2022 to December 31, 2022 were released by the Board of Managing Directors and forwarded to the Supervisory Board for approval.

(2) 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. Various other amendments have been issued as well, but these are not expected to be of relevance to the consolidated financial statements of Heraeus.

Amendments to IFRS 16 – 'COVID-19-Related Rent Concessions beyond 30 June 2021'

IFRS 16 sets out rules for the presentation of changes to lease payments (e.g. rent concessions) in the lessee's accounts. The lessee generally has to review for each individual lease whether the rent concessions granted constitute a lease modification and has to perform any resulting remeasurements of lease liabilities.

For rent concessions granted in connection with the coronavirus pandemic, a time-limited practical expedient was introduced. It allows the lessee to report COVID-19-related rent concessions as if no lease modification had occurred rather than requiring application of the normal rules for lease modifications.

In response to the ongoing impact of the coronavirus pandemic, IFRS 16 'Leases' was amended on March 31, 2021 in order to extend, by one year, the practical expedient that makes it easier for lessees to account for COVID-19-related rent concessions. The amendments extend the practical expedient to rent concessions that reduce lease payments that were originally due on or before June 30, 2022. Previously, the practical expedient covered only rent concessions that reduced lease payments due on or before June 30, 2021.

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

Amendments to IAS 37 – 'Onerous Contracts – Cost of Fulfilling a Contract'

The amendments affect the definition of the costs that a company should include when assessing whether a contract is onerous. Under this definition, the cost of fulfilling a contract comprises all costs that relate directly to the contract. This includes costs that would not be incurred if the contract had not been concluded (incremental costs) and other costs that are directly attributable to the contract.

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

(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

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.

The amendments come into force for reporting periods commencing on or after January 1, 2023. Early application of the amendments is permitted.

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

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.

The amendments come into force for reporting periods commencing on or after January 1, 2023. Early application of the amendments is permitted.

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

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.

The amendments come into force for reporting periods commencing on or after January 1, 2023. Early application of the amendments is permitted.

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

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.

The amendments come into force for reporting periods commencing on or after January 1, 2023. 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 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 reporting years 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 nine foreign subsidiaries (2021: eight), 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, 2022	Dec. 31, 2021	2022	2021
China	CNY	7.3582	7.1947	7.0788	7.6282
UK	GBP	0.8869	0.8403	0.8528	0.8596
Hong Kong	HKD	8.3163	8.8333	8.2451	9.1932
Japan	JPY	140.66	130.38	138.03	129.88
South Korea	KRW	1,344.09	1,346.38	1,358.07	1,354.06
Switzerland	CHF	0.9847	1.0331	1.0047	1.0811
USA	USD	1.0666	1.1326	1.0530	1.1827

(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. As soon as goodwill is impaired in full, it is treated as a disposal in the consolidated statement of changes in non-current assets.

(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 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. It is generally recognized at contracted cost of purchase. Obligations to cover forward purchases already entered into that are due to be settled after the balance sheet date are recognized in the amount required to meet the obligations 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.

Regular way 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, as a rule, are based on the lifetime expected credit losses.

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, or
- non-compliance with payment terms.

As in 2021, no material need to recognize impairment losses on credit balances with banks or other debt instruments was identified in 2022.

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, or
- 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.

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 not recognized in profit or loss are likewise not recognized in profit or loss. In line with their underlying transactions, they are either recognized in other comprehensive income or taken directly to 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 certain 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. In trading transactions, control routinely passes with effect from the due date; in recycling transactions, this takes place on the day that the customer is reimbursed.

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 in certain cases and are shown under other assets and other liabilities respectively.

(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.

(7) Use of key accounting estimates and judgments

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.

The likely impact of Russia's war in Ukraine was estimated in particular for the purposes of determining impairment losses on trade receivables ('expected credit loss model') and testing goodwill for impairment. Based on the assumptions made in this context and current assessments, the war in Ukraine is not expected to have any material impact on the financial position and financial performance of Heraeus. However, the political and macroeconomic fallout from the war in Ukraine is not foreseeable at this point in time and there is therefore a possibility of indirect impacts on Heraeus. In light of these circumstances, relevant estimates are subject to increased uncertainty.

(a) Assumptions and estimation uncertainties

Business combinations (see (9)): Determination of the fair value of the consideration transferred (including contingent consideration) and 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.

(b) Judgments

Investments accounted for using the equity method (see (12)): Decisions about whether an investment might be deemed not to be controlled by Heraeus, despite Heraeus holding a majority of voting rights.

(8) Scope of consolidation

In addition to Heraeus Holding GmbH, the consolidated financial statements include subsidiaries over which Heraeus Holding GmbH exercises control.

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

The following table shows the breakdown of consolidated entities:

Consolidated subsidiaries

	2022			2021		
	Total	In Germany	Outside Germany	Total	In Germany	Outside Germany
Balance as of Jan. 1	120	29	91	111	28	83
Additions	9	4	5	11	1	10
Disposals	–	–	–	– 1	–	– 1
Mergers	– 1	–	– 1	– 1	–	– 1
Balance as of Dec. 31	128	33	95	120	29	91

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

	2022			2021		
	Total	In Germany	Outside Germany	Total	In Germany	Outside Germany
Balance as of Jan. 1	8	1	7	8	1	7
Additions	1	–	1	–	–	–
Balance as of Dec. 31	9	1	8	8	1	7

(9) Corporate transactions

(a) Business combinations in 2022

The following acquisitions took place in the reporting year:

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

The total consideration transferred came to €8.9 million (of which €8.0 million in cash).

(b) Business combinations in 2021

The following acquisitions took place in the previous year:

	Type of acquisition	Voting rights acquired (%)	Date of acquisition
Start-ups			
Amorphous Metal Solutions GmbH, Germany	Share Deal	100.0	June 30, 2021
Mo Sci LLC, USA und ETS Wound Care, LLC, USA	Share Deal	100.0	Dec. 21, 2021
Heraeus Conamic			
HS Advanced Materials, Co., Ltd., South Korea	Share Deal	100.0	Nov. 1, 2021
Norwood Medical			
Norwood Medical LLC, USA	Share Deal	100.0	Dec. 14, 2021

The total consideration transferred came to €925.3 million (of which €922.1 million had been transferred in cash as of December 31, 2021). Compared with the previous year, no material adjustments were made regarding the purchase price allocation in 2022. No further purchase price payments were made in 2022 in connection with the business combinations that took place in 2021.

(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 is expected to be completed in the first half of 2023.

Heraeus has concluded extensive service agreements with Yageo concerning the continuation of operations at the Kleinostheim site.

The associated assets and liabilities are reported as a disposal group.

As of December 31, 2022, the disposal group included the following assets and liabilities:

€ million	Dec. 31, 2022
Other intangible assets	0.5
Property, plant, and equipment	37.1
Inventories – excluding precious metals	19.5
Other assets	20.7
Assets held for sale	77.8
Pensions and similar obligations	11.5
Provisions	5.4
Other liabilities	5.6
Liabilities directly associated with assets held for sale	22.5

In addition, retained earnings include cumulative expenses of €2.2 million from the remeasurement of defined benefit pension plans in connection with this disposal group.

Notes to the consolidated balance sheet

(10) Intangible assets

(a) Goodwill

Goodwill increased from €500.4 million in 2021 to €527.4 million in the reporting year. The change mainly arose from gains of €27.2 million resulting from higher exchange rates.

Goodwill is usually monitored at global business unit 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 on the basis of the value in use and a five-year planning period; the gross margin, calculated on the basis of past experience, is the most important key assumption in this context. The discount rates before taxes ranged from 8.9 percent to 13.3 percent (2021: 9.0 percent to 11.3 percent) and the rates of growth in perpetuity from 0 percent to 2 percent (2021: 0 percent to 2 percent). For Norwood Medical, a discount rate before taxes of 8.9 percent and a rate of growth in perpetuity of 2 percent were applied. The value in use exceeded the carrying amount by €97.4 million. Raising the discount rate before taxes by 0.7 percentage points would have brought the value in use in line with the carrying amount. Other key assumptions were classified as noncritical.

As in 2021, no impairment losses on goodwill were recognized in the reporting year.

Goodwill was allocated to the global business units as follows:

€ million	Dec. 31, 2022	Dec. 31, 2021
Heraeus Medevio (formerly: Heraeus Medical Components)	62.0	59.2
Norwood Medical	343.4	322.3
Heraeus Electronics	14.1	13.7
Heraeus Electro-Nite	26.5	25.9
Heraeus Nexensos	–	0.5
Start-ups	23.3	22.6
Heraeus Precious Metals	27.4	26.2
Heraeus Noblelight	30.7	30.0
Goodwill	527.4	500.4

(b) Other intangible assets

€ million	Goodwill	Customer relationships, brands, licenses and similar rights	Internally generated intangible assets	Total
Jan. 1, 2021				
Cost	153.3	527.2	5.0	685.5
Accumulated amortization and impairment	- 7.2	- 374.1	- 3.2	- 384.5
Net carrying amount	146.1	153.1	1.8	301.0
Financial year ended Dec. 31, 2021				
Net carrying amount as of Jan. 1, 2021	146.1	153.1	1.8	301.0
Exchange differences	7.5	4.0	-	11.5
Additions through business combinations	346.8	400.7	0.3	747.8
Additions	-	1.4	0.3	1.7
Reclassifications	-	0.5	0.3	0.8
Amortization	-	- 26.8	- 0.6	- 27.4
Net carrying amount as of Dec.31, 2021	500.4	532.9	2.1	1,035.4
Dec. 31, 2021 / 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				
Cost	534.2	997.6	5.8	1,537.6
Accumulated amortization and impairment	- 6.8	- 479.4	- 4.6	- 490.8
Net carrying amount	527.4	518.2	1.2	1,046.8

Research and development costs amounting to €155.8 million (2021: €138.4 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, 2021					
Cost	748.7	1,110.8	656.0	240.8	2,756.3
Accumulated depreciation and impairment	– 366.5	– 708.0	– 464.7	– 27.5	– 1,566.7
Net carrying amount	382.2	402.8	191.3	213.3	1,189.6
Financial year ended Dec. 31, 2021					
Net carrying amount as of Jan. 1, 2021	382.2	402.8	191.3	213.3	1,189.6
Exchange differences	11.3	12.9	4.2	5.7	34.1
Additions through business combinations	3.9	72.3	1.5	0.1	77.8
Additions	25.3	20.4	19.4	181.6	246.7
Disposals	– 2.6	– 1.2	– 1.6	– 0.1	– 5.5
Reclassifications	39.7	48.4	24.9	– 113.8	– 0.8
Depreciation	– 17.7	– 60.7	– 34.2	–	– 112.6
Impairment losses	– 0.2	– 20.7	– 5.1	– 1.7	– 27.7
Reversals of impairment losses	–	1.6	0.3	–	1.9
Net carrying amount as of Dec. 31, 2021	441.9	475.8	200.7	285.1	1,403.5
Dec. 31, 2021 / 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
Disposals to assets held for sale	–	– 27.0	– 4.1	– 5.1	– 36.2
Net carrying amount as of Dec. 31, 2022	506.8	435.5	209.2	378.1	1,529.6
Dec. 31, 2022					
Cost	902.8	1,370.2	721.2	397.2	3,391.4
Accumulated depreciation and impairment	– 396.0	– 934.7	– 512.0	– 19.1	– 1,861.8
Net carrying amount	506.8	435.5	209.2	378.1	1,529.6

The impairment losses of €30.7 million (2021: €13.9 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 the expansion of the 5G infrastructure 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 2021, 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 2021, the impairment losses were reported in the consolidated income statement under the item 'Amortization, depreciation, and impairment'.

Contrary to previous expectations, some equipment at the Bitterfeld site can be used again in the future as a result of planned changes of use. The corresponding reversals of impairment losses to amortized cost amount to €9.7 million and are reported in other operating income.

(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, 2022	Dec. 31, 2021	2022	2021
Land, land rights and buildings, including buildings on land owned by others	66.7	102.4	- 16.8	- 15.7
Plant and machinery	2.1	1.2	- 0.5	- 0.3
Office furniture and equipment	10.3	10.8	- 6.8	- 7.0
Right-of-use assets	79.1	114.4	- 24.1	- 23.0

Additions to right-of-use assets amounted to €28.2 million in the reporting year (2021: €53.4 million), of which €4.0 million (2021: €30.2 million) was attributable to acquisitions. Right-of-use assets amounting to €0.9 million were reclassified to assets held for sale. A purchase option on right-of-use assets of €29.6 million relating to land and buildings was exercised. 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, 2022	Dec. 31, 2021
Property, plant, and equipment excluding right-of-use assets	1,529.6	1,403.5
Right-of-use assets	79.1	114.4
Property, plant, and equipment	1,608.7	1,517.9

(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, 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
Balance as of Dec. 31, 2021					
Carrying amount of investment	108.2	62.3	28.2	45.8	244.5
Prorated profit	17.5	1.3	8.6	6.8	34.2

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, 2022	Dec. 31, 2021
Share in percent	50.0	50.0
Non-current assets	88.2	67.6
Current assets	191.5	226.0
<i>thereof cash and cash equivalents</i>	<i>59.6</i>	<i>119.7</i>
Non-current liabilities	14.6	14.7
<i>thereof financial liabilities excluding trade payables and other liabilities</i>	<i>-</i>	<i>-</i>
Current liabilities	60.5	62.5
<i>thereof financial liabilities excluding trade payables and other liabilities</i>	<i>-</i>	<i>-</i>
Net assets (100%)	204.6	216.4
Share of net assets	102.3	108.2
Carrying amount of investment in joint venture	102.3	108.2
€ million	2022	2021
Distributions received	45.2	7.4
Revenue	216.8	194.1
Profit after taxes / total comprehensive income	93.2	35.0
Group's share in profit after taxes / total comprehensive income	46.6	17.5

Joint venture: revalyu Resources GmbH (formerly: perPETual Technologies GmbH)

The operating activities of revalyu Resources GmbH (formerly: perPETual Technologies 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 all key decisions can only be made together with the other shareholder, 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, 2022	Dec. 31, 2021
Share in percent	53.38	53.38
Non-current assets	80.1	69.4
Current assets	56.8	62.1
<i>thereof cash and cash equivalents</i>	<i>49.1</i>	<i>55.0</i>
Non-current liabilities	20.1	13.0
<i>thereof financial liabilities excluding trade payables and other liabilities</i>	<i>20.1</i>	<i>13.0</i>
Current liabilities	3.6	1.8
<i>thereof financial liabilities excluding trade payables and other liabilities</i>	<i>0.1</i>	–
Net assets (100%)	113.2	116.7
Share of net assets	60.4	62.3
Carrying amount of investment in joint venture	60.4	62.3
	–	–
€ million	2022	2021
Distributions received	–	–
Revenue	15.6	16.9
Profit after taxes / total comprehensive income	– 3.5	2.5
Group's share in profit after taxes / total comprehensive income	– 1.9	1.3

(13) Other financial assets

Other financial assets comprise the following items:

€ million	Dec. 31, 2022			Dec. 31, 2021		
	Current	Non-Current	Total	Current	Non-Current	Total
Receivables from precious metal swaps	60.3	–	60.3	318.5	–	318.5
Financial assets	–	24.4	24.4	–	37.0	37.0
Derivatives with positive fair value	23.0	–	23.0	23.6	0.2	23.8
Lease receivables	1.3	2.0	3.3	1.3	3.3	4.6
Margin accounts	10.0	–	10.0	6.8	–	6.8
Miscellaneous financial assets	63.6	62.6	126.2	15.1	5.2	20.3
Other financial assets	158.2	89.0	247.2	365.3	45.7	411.0

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, 2022			Dec. 31, 2021		
	Current	Non-Current	Total	Current	Non-Current	Total
Other tax receivables	157.9	2.6	160.5	124.8	2.3	127.1
Advances paid	25.4	–	25.4	17.0	0.1	17.1
Contract assets	8.8	7.0	15.8	7.4	–	7.4
Miscellaneous non-financial assets	27.1	0.1	27.2	64.2	0.3	64.5
Other assets	219.2	9.7	228.9	213.4	2.7	216.1

(15) Inventories

The table below gives a breakdown of inventories:

€ million	Dec. 31, 2022	Dec. 31, 2021
Materials and supplies	304.7	245.1
Work in progress, finished goods, and merchandise	438.8	396.7
Write-downs of inventories – excluding precious metals	– 80.8	– 75.7
Inventories – excluding precious metals	662.7	566.1
Precious metals	1,174.3	1,268.4
Write-downs of precious metals	– 11.6	– 12.4
Precious metals	1,162.7	1,256.0
Inventories	1,825.4	1,822.1

Impairment losses of €7.3 million (2021: €9.9 million) were recognized on inventories excluding precious metals in 2022. Reversals of write-downs on inventories excluding precious metals amounted to €6.4 million in 2022 (2021: €6.4 million). As in 2021, no material write-downs or reversals of write-downs were recognized on precious metals.

(16) Trade receivables

The breakdown of trade receivables is as follows:

€ million	Dec. 31, 2022	Dec. 31, 2021
Gross trade receivables	689.5	721.7
Impairment losses	– 37.4	– 34.6
Net trade receivables	652.1	687.1
Assets arising from bills of exchange	107.7	163.5
Trade receivables	759.8	850.6

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. This process takes account of forward-looking macroeconomic indicators and duly considers the economic impact of the war in Ukraine.

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	2022	2021
Impairment losses as of Jan. 1	- 34.6	- 32.4
Currency translation	0.2	- 2.1
Additions	- 7.3	- 6.3
Utilizations	1.5	0.7
Reversals	2.8	5.5
Impairment losses as of Dec. 31	- 37.4	- 34.6

The impairment loss of €4.5 million that was recognized in the consolidated income statement (2021: loss of €0.8 million) represents the net balance of additions and reversals.

The following table presents the provision matrix for 2022:

€ 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

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

€ million	Term to maturity as of Dec. 31, 2021					Total
	Not due	less than 30 days	between 30 and 90 days	between 91 and 180 days	more than 180 days	
Gross trade receivables	523.1	112.4	22.9	30.9	32.4	721.7
Weighted average default rate	0.1 %	0.1 %	5.7 %	17.2 %	84.9 %	
Impairment losses	- 0.4	- 0.1	- 1.3	- 5.3	- 27.5	- 34.6
Net receivables	522.7	112.3	21.6	25.6	4.9	687.1

(17) Cash and cash equivalents

Cash and cash equivalents comprise the following items:

€ million	Dec. 31, 2022	Dec. 31, 2021
Credit balances with banks, cash on hand, and other cash	822.2	588.7
Short-term deposits	112.3	61.2
Cash and cash equivalents	934.5	649.9

(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 2021, 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.

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 Board of Managing Directors of Heraeus Holding GmbH have proposed a dividend distribution of €99.6 million (2021: €45.1 million) for the 2022 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 2022 were €10.4 million (2021: €8.4 million). As in 2021, 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, 2022	Dec. 31, 2021	Change in %
Shareholders' equity	4,532.5	3,801.4	19.2
Percentage of total shareholders' equity and liabilities	86.0	83.0	
Current financial debt	65.4	597.5	
Non-current financial debt	674.0	182.7	
Financial debt	739.4	780.2	- 5.2
Percentage of total shareholders' equity and liabilities	14.0	17.0	
Total shareholders' equity and liabilities (shareholders' equity plus financial debt)	5,271.9	4,581.6	15.1

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, 2022		Dec. 31, 2021	
	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. 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.

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, 2022		Dec. 31, 2021	
	In Germany	Outside Germany	In Germany	Outside Germany
Discount rate	4.20	3.23	1.30	0.94
Income growth (annual)	3.00	3.00	3.00	1.74
Pension adjustment (annual)	1.5 – 2.0	–	1.0 – 1.5	–
Future increase in healthcare costs	–	3.9 – 6.3	–	4.0 – 6.0

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, 2022	Dec. 31, 2021
Pensions and similar obligations of companies in Germany	293.1	512.4
Pensions and similar obligations of companies outside Germany	32.7	53.6
Pensions and similar obligations	325.8	566.0

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, 2022			Dec. 31, 2021		
	In Germany	Outside Germany	Total	In Germany	Outside Germany	Total
Present value of funded defined benefit obligation	211.3	116.2	327.5	355.2	148.7	503.9
Present value of unfunded defined benefit obligation	232.3	30.5	262.8	334.0	37.4	371.4
Present value of the defined benefit obligation	443.6	146.7	590.3	689.2	186.1	875.3
Fair value of plan assets	– 150.5	– 114.0	– 264.5	– 176.8	– 132.5	– 309.3
Net liability	293.1	32.7	325.8	512.4	53.6	566.0

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

€ million	2022			2021		
	In Germany	Outside Germany	Total	In Germany	Outside Germany	Total
Present value of the defined benefit obligation as of Jan. 1	689.2	186.1	875.3	724.3	191.8	916.1
Currency translation	–	1.3	1.3	–	5.6	5.6
Current service cost	8.5	6.4	14.9	11.3	6.9	18.2
Actuarial gains (–)/losses (+)	– 230.9	– 40.8	– 271.7	– 41.7	– 13.1	– 54.8
Interest expenses	8.9	1.8	10.7	7.2	1.1	8.3
Employee contributions	6.1	2.8	8.9	6.1	1.7	7.8
Pension payments	– 17.8	– 14.4	– 32.2	– 18.0	– 7.7	– 25.7
Liabilities directly associated with assets held for sale	– 18.4	–	– 18.4	–	–	–
Other changes	– 2.0	3.5	1.5	–	– 0.2	– 0.2
Present value of the defined benefit obligation as of Dec. 31	443.6	146.7	590.3	689.2	186.1	875.3

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, 2022	Dec. 31, 2021
Discount rate		
+ 0.5 percentage points	– 23.5	– 65.6
– 0.5 percentage points	26.6	77.2
Annual income growth		
+ 0.5 percentage points	0.9	2.0
– 0.5 percentage points	– 0.8	– 1.9
Annual pension adjustment		
+ 0.5 percentage points	16.2	30.3
– 0.5 percentage points	– 14.9	– 27.5

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 gains of €230.9 million reported in Germany (2021: net gains of €41.7 million) comprised gains of €234.9 million (2021: gains of €44.8 million) attributable to changes in financial assumptions and losses of €4.0 million (2021: losses of €3.1 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: €206.3 million (2021: €371.8 million)
- former employees with vested rights: €59.2 million (2021: €93.4 million)
- pensioners and surviving dependants: €178.1 million (2021: €224.0 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, 2022 was 14.6 years (2021: 20.4 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 2023 (year 1): €16.7 million (2021: financial year 2022 – €16.4 million)
- financial years 2024–2027 (years 2 to 5): €74.9 million (2021: financial years 2023–2026 – €73.3 million)
- financial years 2028–2032 (years 6 to 10): €110.2 million (2021: financial years 2027–2031 – €106.0 million)

Outside Germany, pension entitlements are expected to result in pension payments of €11.7 million in 2023 (prior-year expectation for 2022: €9.7 million).

Changes in the fair value of the plan assets during 2022 for companies in and outside Germany are shown below:

€ million	2022			2021		
	In Germany	Outside Germany	Total	In Germany	Outside Germany	Total
Fair value of plan assets as of Jan. 1	176.8	132.5	309.3	159.1	120.4	279.5
Currency translation	–	0.5	0.5	–	4.9	4.9
Interest income	2.3	1.3	3.6	1.6	0.8	2.4
Return on (+)/expenses from (–) plan assets excl. interest income	– 29.3	– 18.9	– 48.2	8.6	5.9	14.5
Employer contributions	5.1	7.0	12.1	4.2	6.9	11.1
Employee contributions	6.1	2.9	9.0	6.1	1.7	7.8
Pension payments	– 3.6	– 13.9	– 17.5	– 2.8	– 8.1	– 10.9
Reclassification to liabilities directly associated with assets held for sale	– 6.9	–	– 6.9	–	–	–
Other changes	–	2.6	2.6	–	–	–
Fair value of plan assets as of Dec. 31	150.5	114.0	264.5	176.8	132.5	309.3

Heraeus anticipates that employer contributions to plan assets for companies in Germany will be approximately €4.8 million in 2023 (2022: €5.2 million) and approximately €8.4 million (2022: €6.5 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, 2022			Dec. 31, 2021		
	In Germany	Outside Germany	Total	In Germany	Outside Germany	Total
Debt instruments	102.4	17.4	119.8	120.6	29.3	149.9
Equity instruments	47.9	12.6	60.5	56.1	21.2	77.3
Money-market-linked instruments and credit balances with banks	0.2	9.5	9.7	0.1	5.0	5.1
Real estate	–	11.4	11.4	–	11.0	11.0
Receivables from insurance companies	–	37.6	37.6	–	34.6	34.6
Mixed funds	–	21.0	21.0	–	29.8	29.8
Other assets	–	4.5	4.5	–	1.6	1.6
Fair value of plan assets	150.5	114.0	264.5	176.8	132.5	309.3

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	2022			2021		
		In Germany	Outside Germany	Total	In Germany	Outside Germany	Total
Current service cost		- 8.5	- 6.4	- 14.9	- 11.3	- 6.9	- 18.2
Interest expenses of defined benefit obligation	(32)	- 8.9	- 1.8	- 10.7	- 7.2	- 1.1	- 8.3
Interest income on plan assets	(32)	2.3	1.3	3.6	1.6	0.8	2.4
Net pension expenses – reported in the income statement		- 15.1	- 6.9	- 22.0	- 16.9	- 7.2	- 24.1
Actuarial gains (+)/losses (-) in the present value of the defined benefit obligation		230.9	40.8	271.7	41.7	13.1	54.8
Return on (+)/expenses from (-) plan assets excl. interest income		- 29.3	- 18.9	- 48.2	8.6	5.9	14.5
Gains (+)/losses (-) – recognized in other comprehensive income		201.6	21.9	223.5	50.3	19.0	69.3

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 €7.7 million (2021: €6.4 million) relating to these schemes were recognized in personnel expenses and they mainly concern companies outside Germany. Furthermore, employer contributions of €31.3 million (2021: €30.4 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, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Provisions						
for personnel expenses	98.0	86.1	19.9	22.7	117.9	108.8
for warranties	10.3	6.8	4.2	0.2	14.5	7.0
for restructuring	9.8	17.1	0.1	0.8	9.9	17.9
for outstanding costs for precious metal recycling	9.3	9.4	–	–	9.3	9.4
for dismantling and disposal costs	–	0.2	3.8	4.5	3.8	4.7
for patent disputes and litigation	3.0	19.8	–	–	3.0	19.8
miscellaneous	46.2	16.9	17.1	17.8	63.3	34.7
Total	176.6	156.3	45.1	46.0	221.7	202.3

The current provisions for personnel expenses of €98.0 million (2021: €86.1 million) include bonus payments, severance payments, performance-related compensation, and other employee benefits. The provisions for restructuring mainly relate to programs that were initiated in previous years and primarily affect locations in Germany.

The non-current provisions for personnel expenses of €19.9 million (2021: €22.7 million) mainly relate to long-service awards.

The following table shows changes in provisions in 2022:

€ million	Jan. 1, 2022	Currency translation	Additions	Unwinding of discount	Utilization	Reversal	Other	Dec. 31, 2022
Provisions								
for personnel expenses	108.8	1.0	97.1	0.2	– 81.3	– 5.0	– 2.9	117.9
for warranties	7.0	0.1	10.3	–	– 2.4	– 0.5	–	14.5
for restructuring	17.9	–	0.8	–	– 7.3	– 1.1	– 0.4	9.9
for outstanding costs for precious metal recycling	9.4	0.2	6.7	–	– 7.0	–	–	9.3
for dismantling and disposal costs	4.7	–	0.5	–	– 0.3	– 1.1	–	3.8
for patent disputes and litigation	19.8	0.3	0.4	–	– 0.5	– 17.0	–	3.0
miscellaneous	34.7	–	40.3	–	– 8.1	– 1.5	– 2.1	63.3
Total	202.3	1.6	156.1	0.2	– 106.9	– 26.2	– 5.4	221.7

(23) Financial debt

Financial debt is broken down as follows:

€ million	Dec. 31, 2022			Dec. 31, 2021		
	Current	Non-Current	Total	Current	Non-Current	Total
Bonds	–	497.8	497.8	–	–	–
Registered bonds	–	98.3	98.3	–	98.2	98.2
Lease liabilities	19.8	71.6	91.4	37.3	71.5	108.8
Liabilities to banks	45.6	6.3	51.9	560.2	13.0	573.2
Financial debt	65.4	674.0	739.4	597.5	182.7	780.2

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, 2022			Dec. 31, 2021		
	Current	Non-Current	Total	Current	Non-Current	Total
Effective interest rate						
4.01 % – fixed rate	–	49.0	49.0	–	48.9	48.9
3.91 % – fixed rate	–	49.3	49.3	–	49.3	49.3
Registered bonds	–	98.3	98.3	–	98.2	98.2

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.

Long-term liabilities to banks comprise a development loan from the KfW banking group that was taken out by Heraeus Holding GmbH. The loan has an effective interest rate of 0.95 percent and must be repaid by March 2026.

The decrease in current liabilities to banks is mainly due to the repayment of a syndicated loan of €500.0 million that had been taken out by Heraeus Holding GmbH in December 2021.

(24) Other financial liabilities

Other financial liabilities are broken down as follows:

€ million	Dec. 31, 2022			Dec. 31, 2021		
	Current	Non-Current	Total	Current	Non-Current	Total
Liabilities from precious metal swaps	174.7	–	174.7	521.0	–	521.0
Derivatives with negative fair value	40.7	9.5	50.2	33.6	1.1	34.7
Miscellaneous financial liabilities	34.1	4.7	38.8	44.2	9.9	54.1
Other financial liabilities	249.5	14.2	263.7	598.8	11.0	609.8

(25) Other liabilities

Other liabilities comprise the following items:

€ million	Dec. 31, 2022			Dec. 31, 2021		
	Current	Non-Current	Total	Current	Non-Current	Total
Liabilities from precious metal trading contracts	93.5	–	93.5	205.9	–	205.9
Other tax liabilities	107.7	–	107.7	97.3	–	97.3
Liabilities for personnel expenses	42.6	3.2	45.8	46.1	2.7	48.8
Contract liabilities	70.1	5.0	75.1	48.0	7.4	55.4
Miscellaneous non-financial liabilities	26.1	5.6	31.7	88.1	5.1	93.2
Other liabilities	340.0	13.8	353.8	485.4	15.2	500.6

The following table shows changes in contract liabilities in 2022:

€ million	2022	2021
Contract liabilities as of Jan. 1	55.4	47.7
Currency transaction	– 1.1	3.5
Additions from business combination	–	1.9
Additions	72.4	56.1
Recognized as revenue	– 51.6	– 53.8
Contract liabilities as of Dec. 31	75.1	55.4

(26) Trade payables

Trade payables are current liabilities and amounted to €493.4 million as of the end of the financial year (2021: €400.5 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 field of activity was allocated as follows:

€ million	2022	2021
Health	782.1	458.4
Electronics	686.6	531.3
Industrials	759.2	690.2
Environmental	667.1	591.8
Corporate	4.8	0.8
Revenue excluding precious metals	2,899.8	2,272.5
Precious metal revenue	26,182.4	27,233.9
Revenue	29,082.2	29,506.4

The breakdown of revenue by region was as follows:

€ million	2022	2021
Germany	307.9	310.2
Europe excluding Germany	603.0	450.6
Americas	931.1	585.7
Asia	1,004.2	875.5
Other	53.6	50.5
Revenue excluding precious metals	2,899.8	2,272.5
Precious metal revenue	26,182.4	27,233.9
Revenue	29,082.2	29,506.4

(28) Personnel expenses

Personnel expenses consist of the following:

€ million	2022	2021
Wages and salaries	- 949.2	- 759.3
Social security contributions and expenses for other benefits	- 127.7	- 112.7
Pension expenses	- 21.5	- 25.5
Personnel expenses	- 1,098.4	- 897.5

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

Field of activity	2022	2021
Health	3,555	2,305
Electronics	3,149	2,918
Industrials	4,213	4,203
Environmental	3,411	3,266
Corporate	1,190	1,232
Total	15,518	13,924

The remuneration of active members of the Board of Managing Directors for 2022 amounted to €9.2 million (2021: €9.6 million); of which €7.2 million (2021: €7.2 million) was performance related.* The remuneration represented short-term employee benefits. In addition, post-employment benefits of the Board of Managing Directors amounted to €1.1 million in 2022 (2021: €1.1 million).

The remuneration of members of the Supervisory Board for 2022 amounted to €0.7 million (2021: €0.7 million). The total remuneration for the Shareholders' Committee was €0.1 million (2021: €0.1 million).

Former members of the Board of Managing Directors or their surviving dependants received remuneration of €1.3 million in 2022 (2021: €1.3 million). Obligations of €15.6 million (2021: €21.0 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	2022	2021
Amortization on intangible assets	(10)	- 57.1	- 27.4
Depreciation on property, plant, and equipment		- 158.8	- 135.6
<i>thereof on property, plant, and equipment without right-of-use assets</i>	(11a)	- 134.7	- 112.6
<i>thereof on right-of-use assets</i>	(11b)	- 24.1	- 23.0
Amortization and depreciation		- 215.9	- 163.0
Impairment on intangible assets	(10)	- 1.1	-
Impairment on property, plant, and equipment		- 44.3	- 27.7
<i>thereof on property, plant, and equipment without right-of-use assets</i>	(11a)	- 39.9	- 27.7
<i>thereof on right-of-use assets</i>	(11b)	- 4.4	-
Impairment		- 45.4	- 27.7
Amortization, depreciation, and impairment		- 261.3	- 190.7

(30) Other operating income

The main individual items in other operating income were income from the reversal of provisions (€20.9 million; 2021: €3.2 million) and from the reversal of impairment on intangible assets and property, plant, and equipment (€11.0 million; 2021: €1.9 million). Other operating income also included foreign currency gains of €9.5 million (2021: €0.0 million).

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

* Prior-year figures have been adjusted

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.

(31) Other operating expenses

Other operating expenses largely comprised expenses arising from external services (€134.8 million; 2021: €115.2 million), maintenance and repairs (€88.7 million; 2021: €57.9 million), and freight out (€72.8 million; 2021: €60.6 million). Other operating expenses did not include any foreign currency losses (2021: €4.1 million).

Expenses for leases where the underlying asset has a low value amounted to €2.3 million (2021: €1.9 million) in the reporting year (see (11b)).

(32) Net finance costs

Net finance costs comprise the following income and expenses:

€ million	Note	2022	2021
Interest and similar income		27.1	22.9
Net changes from the valuation and disposal of financial assets measured at fair value		19.1	0.9
Finance income		46.2	23.8
Interest expenses and similar charges		- 46.8	- 41.9
Losses on the measurement of derivatives and loans		-	- 0.9
Net interest expenses for pensions and similar obligations	(21)	- 7.1	- 5.9
Interest expenses on lease liabilities	(11b)	- 3.1	- 2.7
Finance costs		- 57.0	- 51.4
Net finance costs		- 10.8	- 27.6

(33) Income taxes

The breakdown of income taxes is as follows:

€ million	2022	2021
Current taxes in Germany	- 76.9	- 21.3
Current taxes outside Germany	- 78.6	- 71.9
Current taxes	- 155.5	- 93.2
<i>thereof from prior periods</i>	<i>9.5</i>	<i>- 5.7</i>
Deferred taxes	- 22.5	- 33.4
Income taxes	- 178.0	- 126.6

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 (2021: 15.8 percent) and trade tax, which varied from 10.9 percent to 18.2 percent (2021: 11.6 percent to 15.8 percent) depending on the local assessment rate. Consequently, tax rates of 26.7 percent to 34.0 percent (2021: 27.5 percent to 31.6 percent) applied to German Group companies.

Tax rates outside Germany varied between 4.0 percent and 43.0 percent (2021: 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	2022	2021
Profit before taxes	677.4	495.9
Expected income tax expense (tax rate for Hanau site: 30.8 percent; 2021: 30.8 percent)	- 208.7	- 152.7
Variations:		
Difference between local tax rate and Group tax rate	55.1	31.7
Change in tax rate	0.4	- 1.6
Impairment losses/reversals of impairment losses	- 3.4	2.9
Tax-exempt income	3.2	2.0
Non-deductible operating expenses for tax purposes	- 6.3	- 4.2
Income tax for previous years	- 9.5	- 5.6
Other	- 8.8	0.9
Reported tax expenses	- 178.0	- 126.6
Effective tax rate (%)	26.3	25.5

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, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	2022	2021
	Intangible assets	54.2	57.7	22.9	21.6	- 2.9
Property, plant, and equipment	9.7	6.0	81.6	77.4	- 0.5	- 4.7
Inventories	26.5	24.8	71.8	74.4	4.3	- 19.2
Other assets	24.2	20.3	35.0	37.0	16.4	2.8
Pensions and similar obligations	61.0	119.6	20.4	16.6	- 8.4	- 0.9
Provisions	14.9	21.1	5.0	11.3	0.1	- 3.4
Liabilities	29.6	44.9	3.9	5.4	- 13.8	6.2
Tax loss carryforwards	2.8	20.5	-	-	- 17.7	- 12.8
Total before offsetting	222.9	314.9	240.6	243.7	- 22.5	- 33.4
Offsetting	- 106.1	- 138.3	- 106.1	- 138.3	-	-
Total	116.8	176.6	134.5	105.4	- 22.5	- 33.4

Tax loss carryforwards as of December 31, 2022 amounted to €256.8 million (2021: €345.3 million). Deferred tax assets were recognized for €11.4 million of the total tax loss carryforwards (2021: €136.5 million). Loss carryforwards of €58.3 million (2021: €57.5 million) are subject to a time limit, with utilization of €26.9 million restricted to the next three years (2021: €7.9 million). There is no statutory expiration date for loss carryforwards of €198.5 million (2021: €287.8 million). No deferred tax assets were recognized for tax loss carryforwards of €245.4 million (2021: €208.8 million) or for temporary differences arising on measurements for tax purposes in the amount of €130.4 million (2021: €159.1 million).

Based on the earnings forecasts for Group companies that incurred losses in 2022 or preceding years, deferred tax assets of €2.8 million (2021: €20.5 million) were recognized on loss carryforwards, and deferred tax assets of €40.9 million (2021: €36.4 million) were not recognized. Reversals of impairment losses were recognized in the amount of €13.7 million in 2022

(2021: €0.2 million). The utilization of previously unrecognized losses reduced the tax expense by €3.1 million (2021: €19.5 million). After deduction of the deferred tax liabilities, a deferred tax asset of €6.2 million (2021: €16.7 million) was recognized for the consolidated companies with a history of losses. Much of the loss carryforwards for these companies have already been utilized thanks to the strength of business in 2022.

Deferred tax liabilities were recognized for temporary differences in investments in subsidiaries when a reversal of these differences was expected.

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 2022 amounted to €95.9 million (2021: €100.5 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 €9.0 million (2021: €909.4 million). This figure includes minor amounts owed in connection with acquisitions in previous years that only caused a cash outflow in the reporting year.

(36) Net cash provided by / used for financing activities

In 2022, a dividend of €45.1 million was paid to the shareholders of Heraeus Holding GmbH (2021: €40.9 million); a dividend of €0.0 million (2021: €5.2 million) was paid to the non-controlling interests.

The table below shows the changes in financial liabilities in 2022 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, 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

In the reporting year, a total cash outflow of €22.3 million (2021: €23.1 million) was recognized in connection with leases (see (11b)).

The following table shows the corresponding changes in 2021:

€ million	Jan. 1, 2021	Cash changes	Non-cash changes			Dec. 31, 2021
			Acquisitions	Currency effects	Other changes	
Non-current financial debt	181.7	- 1.9	-	4.2	- 1.3	182.7
Current financial debt	86.5	462.3	20.5	5.6	22.6	597.5
Total	268.2	460.4	20.5	9.8	21.3	780.2

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

€ million	Dec. 31, 2022	Dec. 31, 2021
Cash change in liabilities from financing activities	- 46.4	460.4
Distributions, including distributions to non-controlling interests	- 45.1	- 46.1
Proceeds from the disposal of treasury shares	0.5	-
Interest paid	- 49.8	- 42.7
Net cash used for / provided by financing activities	- 140.8	371.6

(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 €936.9 million (2021: €649.9 million). Of this total, €- 2.4 million relate to assets classified as held for sale, which are reported separately.

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 2021, Heraeus was not exposed to any material cash-flow interest-rate risk arising from liabilities in 2022, 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\$ 70.2 million or €65.8 million (2021: US\$ 74.9 million or €66.1 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. Futures contracts that do not qualify for the own-use exemption and therefore fall within the scope of IFRS 7 do not entail price risk from an economic perspective, because they are taken out to hedge open positions.

(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 top-quality counterparties. 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
2022	+ 5 %	– 3.5	– 1.6
	– 5 %	3.1	1.5
2021	+ 5 %	– 3.5	– 16.0
	– 5 %	3.1	14.5

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

In 2022, 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, 2022 are expected to be settled in 2023 and 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 2023 and 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 at 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, 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

€ million	Nominal amount hedging instrument	Carrying amounts of hedging instruments as of Dec. 31, 2021		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)	303.5	0.1	7.8	Other financial assets and liabilities	– 7.7
Interest rate risk					
Forward Starting Swap	500.0	3.6	–	Other financial assets	3.6

The following information relates to the hedged items:

€ million	2022		2021	
	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	1.8	– 2.2	7.7	– 7.7
Precious metal price risk				
Forecast purchase of precious metals	– 1.1	1.1	–	–
Interest rate risk				
Bond	–	32.7	– 3.6	3.6

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

€ million	2022			
	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	– 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	

€ million	2021			
	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	– 7.7	–	– 2.2	Other operating expenses
Precious metal price risk				
Hedge of precious metal price for forecast purchases	–	–	–	
Interest rate risk				
Hedge of 5-year interest rate for bond	3.6	–	–	
Total	– 4.1	–	– 2.2	

(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 offset on the consolidated balance sheet pursuant to IAS 32.42.

	Dec. 31, 2022			Dec. 31, 2021		
	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
€ million						
Derivative assets	23.0	– 1.6	21.4	23.8	– 1.6	22.2
Derivative liabilities	50.2	– 1.6	48.6	34.7	– 1.6	33.1

(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, 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 comprehen- sive 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)	22.0	–	22.0	–	–	22.0
Derivatives with positive fair value used as hedges	(13)	1.0	1.0	–	–	–	1.0
Loans	(13)	12.0	–	–	–	12.0	11.9
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	34.0	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)	48.0	–	48.0	–	–	48.0
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	53.8	–	1,440.5	

€ million	Note	Carrying amount Dec. 31, 2021	Measurement category and carrying amount pursuant to IFRS 9				Amortized cost	Fair Value Dec. 31, 2021
			Fair Value hedging instruments	Mandatorily at fair value through profit or loss	Fair Value through other comprehen- sive income			
Financial assets								
Cash and cash equivalents	(17)	649.9	–	–	–	649.9	n.a.	
Trade receivables	(16)	850.6	–	–	–	850.6	n.a.	
Other financial assets:								
Derivatives with positive fair value not used as hedges	(13)	20.2	–	20.2	–	–	20.2	
Derivatives with positive fair value used as hedges	(13)	3.6	3.6	–	–	–	3.6	
Loans	(13)	16.5	–	–	–	16.5	16.5	
Other financial assets measured at fair value	(13)	20.4	–	20.0	0.4	–	20.4	
Other financial assets	(13)	350.3	–	–	–	350.3	n.a.	
			3.6	40.2	0.4	1,867.3		
Financial liabilities								
Trade payables	(26)	400.5	–	–	–	400.5	n.a.	
Financial debt								
Liabilities to banks	(23)	573.2	–	–	–	573.2	n.a.	
Registered bonds	(23)	98.2	–	–	–	98.2	126.6	
Lease liabilities	(23)	108.8	–	–	–	108.8	n.a.	
Other financial liabilities:								
Derivatives with negative fair value not used as hedges	(24)	27.0	–	27.0	–	–	27.0	
Derivatives with negative fair value used as hedges	(24)	7.7	7.7	–	–	–	7.7	
Other financial liabilities measured at fair value	(24)	6.6	–	6.6	–	–	6.6	
Other financial liabilities	(24)	568.5	–	–	–	568.5	n.a.	
			7.7	33.6	–	1,749.2		

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, 2022		Dec. 31, 2021	
	Assets	Liabilities	Assets	Liabilities
Mark-to-model values determined using parameters observed in the market (Level 2)	23.0	- 50.2	23.8	- 34.7
Other financial assets:	23.0	-	23.8	-
Derivatives with positive fair value not used as hedges	22.0	-	20.2	-
Derivatives with positive fair value used as hedges	1.0	-	3.6	-
Other financial liabilities:	-	- 50.2	-	- 34.7
Derivatives with negative fair value not used as hedges	-	- 48.0	-	- 27.0
Derivatives with negative fair value used as hedges	-	- 2.2	-	- 7.7
Theoretical mark-to-model values (Level 3)	12.4	- 5.8	20.4	- 6.6
Other financial assets	12.4	-	20.4	-
Other financial liabilities	-	- 5.8	-	- 6.6

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 2022:

€ million	2022		2021	
	Assets	Liabilities	Assets	Liabilities
Balance as of Jan. 1	20.4	- 6.6	10.6	- 7.5
Gains(+)/Losses(-) recognized in profit or loss	- 2.6	0.3	0.7	- 0.7
Additions	2.5	-	8.9	- 3.1
Disposals/settlements	- 8.2	0.7	-	5.0
Exchange differences recognized in other comprehensive income	0.3	- 0.2	0.2	- 0.3
Balance as of Dec. 31	12.4	- 5.8	20.4	- 6.6

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 2021, 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, 2022		Dec. 31, 2021	
	Assets	Liabilities	Assets	Liabilities
Mark-to-model values determined using parameters observed in the market (Level 2)	12.0	- 572.9	16.5	- 126.6
Loans	12.0	-	16.5	-
Bonds	-	- 476.9	-	-
Registered bonds	-	- 96.0	-	- 126.6

(41) Net gains and losses on financial instruments

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

€ million	2022	2021
Financial assets and liabilities mandatorily measured at fair value through profit and loss	- 33.2	- 1.1
Financial assets measured at amortized cost	72.8	10.6
Financial liabilities measured at amortized cost	- 16.5	- 12.4
Net gain/loss	23.1	- 2.9

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 2022, interest income of €7.3 million (2021: €2.6 million) was generated and interest expenses of €16.5 million (2021: €12.4 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, 2022:

€ million	Cash flows			
	2023	2024	2025 – 2027	from 2027
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	39.2	4.3	3.9	0.6
Derivatives with negative fair value used as hedges	1.4	0.8	–	–

The contractually agreed (undiscounted) interest and principal payments for the non-derivative financial liabilities and the derivative financial liabilities as of December 31, 2021 were as follows:

€ million	Cash flows			
	2022	2023	2024 – 2026	from 2027
Non-derivative financial liabilities:				
Registered bonds	1.4	3.8	11.3	126.3
Liabilities to banks	560.2	6.7	6.3	–
Trade payables	400.5	–	–	–
Lease liabilities	40.4	17.6	33.0	33.5
Other financial liabilities	565.2	5.8	1.0	3.3
Derivative financial liabilities:				
Derivatives with negative fair value not used as hedges	25.9	–	0.8	0.2
Derivatives with negative fair value used as hedges	7.7	–	–	–

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 €86.7 million, of which €86.0 million is payable in 2023 and €0.7 million in 2024 (2021: €83.2 million payable in 2022).

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. 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.

As of the balance sheet date, the total market value of the precious metals on loan from third parties amounted to €1,767.0 million (2021: €1,902.0 million).

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 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, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	2022	2021	2022	2021
	Associates	6.2	10.1	–	–	38.3	57.7	0.7
Joint ventures	11.1	9.6	1.3	1.2	51.0	32.8	22.9	8.3
Total	17.3	19.7	1.3	1.2	89.3	90.5	23.6	8.3

These trading relationships mainly relate to the field of activity Electronics.

Receivables include loans to associates in an amount of €5.0 million (2021: €10.0 million) and loans to joint ventures in an amount of €4.7 million (2021: €4.4 million). These loans have a long term to maturity and are not collateralized.

(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 Ernst & Young GmbH Wirtschaftsprüfungsgesellschaft for auditing services in 2022 amounted to €2.3 million (2021: €1.9 million). The fee for other services was €0.2 million (2021: €0.2 million).

(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 2022:

Contract Medical International GmbH, Dresden
Heraeus Amloy Technologies GmbH, Hanau
Heraeus Battery Technology GmbH, Hanau
Heraeus Beteiligungsverwaltungsgesellschaft mbH, Hanau
Heraeus Business Solutions GmbH, Hanau
Heraeus Consulting & IT Solutions GmbH, Hanau
Heraeus Deutschland GmbH & Co. KG, Hanau
Heraeus Electro-Nite GmbH & Co. KG, Hanau
Heraeus Finance GmbH, Hanau
Heraeus Health & Education Services GmbH, Hanau
Heraeus Medical GmbH, Wehrheim
Heraeus Metals Germany GmbH & Co. KG, Hanau
Heraeus Noblelight GmbH, 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 Site Operations III 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, 2022 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 Deutschland GmbH & Co. KG	Hanau	Germany	100.00
Heraeus Deutschland 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 Finance GmbH	Hanau	Germany	100.00
Heraeus Health & Education Services 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 Nexensos GmbH	Hanau	Germany	100.00
Heraeus Noblelight 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 & Co. KG	Hanau	Germany	100.00
Heraeus Site Operations Verwaltungs GmbH	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
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	Republic of Korea	100.00
Erbas SA	Mendrisio	Switzerland	100.00
ETS Wound Care LLC	Rolla, MO	USA	100.00
Heraeus (China) Investment Co., Ltd.	Shanghai	China	100.00

Name of company	Registered office	Country	Percentage of equity
Heraeus (Thailand) Ltd.	Bangkok	Thailand	100.00
Heraeus Asia Pacific Holding Pte. Ltd.	Singapore	Singapore	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 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	Zaporozhye	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	Republic of 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
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

Name of company	Registered office	Country	Percentage of equity
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	The Netherlands	100.00
Heraeus Nexensos Malaysia Sdn. Bhd.	Kuala Lumpur	Malaysia	100.00
Heraeus Noblelight (Shenyang) Ltd.	Shenyang	China	100.00
Heraeus Noblelight America LLC	Wilmington, DE	USA	100.00
Heraeus Noblelight Ltd.	Cambridge	United Kingdom	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 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	66.67
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 City	China	60.00
MC Sublance Probe Technology Shanghai Co., Ltd.	Shanghai	China	100.00
Minco (Shanghai) Metallurgical 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
Shree Ram Measurement Technologies Pvt. Ltd.	New Delhi	India	100.00
SKO A.S.	Istanbul	Türkiye	100.00
Woojin Electro-Nite Inc.	Pyeongtaek-si	Republic of Korea	100.00

Name of company	Registered office	Country	Percentage of equity
2. Subsidiaries not included in the consolidated financial statements			
In Germany			
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 Epurio 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 Special Warehousing GmbH & Co. KG	Hanau	Germany	100.00
Outside Germany			
ETS Technology Holdings LLC	Rolla, MO	USA	100.00
HEN RBS Trustees Ltd.	Chesterfield	United Kingdom	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			
Outside Germany			
Ankasa Regenerative Therapeutics, Inc.	Wilmington, DE	USA	30.65
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 (formerly: perPETual Technologies 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	Republic of Korea	50.00

Hanau, March 10, 2023

The Board of Management of Heraeus Holding GmbH

Jan Rinnert
Chairman

Dr. André Kobelt

Dr. Frank Stietz

Rolf Wetzel

Independent auditors' report

To Heraeus Holding GmbH

Opinions

We have audited the consolidated financial statements of Heraeus Holding GmbH, Hanau, and its subsidiaries (the Group), which comprise the consolidated statement of financial position as at 31 December 2022, and the consolidated income statement, consolidated statement of comprehensive income, consolidated statement of changes in equity and consolidated statement of cash flows for the fiscal year from 1 January to 31 December 2022, 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, Hanau, for the fiscal year from 1 January to 31 December 2022. We have not audited the content of the section "Compliance report" of the group management report.

In our opinion, on the basis of the knowledge obtained in the audit,

- the accompanying consolidated financial statements comply, in all material respects, with the IFRSs as adopted by the EU, and the additional requirements of German commercial law pursuant to Sec. 315e (1) HGB ["Handelsgesetzbuch": German Commercial Code] and, in compliance with these requirements, give a true and fair view of the assets, liabilities and financial position of the Group as at 31 December 2022 and of its financial performance for the fiscal year from 1 January to 31 December 2022, 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 the abovementioned section "Compliance report" in the group management report.

Pursuant to Sec. 322 (3) Sentence 1 HGB, we declare that our audit has not led to any reservations relating to the legal compliance of the consolidated financial statements and of the 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 Sec. 317 HGB and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer [Institute of Public Auditors in Germany] (IDW). Our responsibilities under those requirements and principles are further described in the "Auditor's responsibilities for the audit of the consolidated financial statements and of the 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 audit 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

The supervisory board is responsible for the supervisory board report. In all other respects, the executive directors are responsible for the other information. The other information comprises parts to be included in the annual report, of which we received a version prior to issuing this auditor's report, in particular:

- Report of the supervisory board
- Foreword by the management board
- Multiple-year overview

In addition, the section "Compliance report" in the group management report is part of "Other information".

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 or our knowledge obtained in the audit, or
- otherwise appears to be materially misstated.

Responsibilities of the executive directors and the supervisory board for the consolidated financial statements and the group management report

The executive directors are responsible for the preparation of the consolidated financial statements that comply, in all material respects, with IFRSs as adopted by the EU and the additional requirements of German commercial law pursuant to Sec. 315e (1) HGB, and that the consolidated financial statements, in compliance with these requirements, give a true and fair view of the assets, liabilities, financial position and financial performance of the Group. In addition, the executive directors are responsible for such internal control as they have determined necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud (i.e., fraudulent financial reporting and misappropriation of assets) or error.

In preparing the consolidated financial statements, the executive directors are responsible for assessing the Group's ability to continue as a going concern. They also have the responsibility for disclosing, as applicable, matters related to going concern. In addition, they are responsible for financial reporting based on the going concern basis of accounting unless there is an intention to liquidate the Group or to cease operations, or there is no realistic alternative but to do so.

Furthermore, the executive directors are responsible for the preparation of the 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, the executive directors are 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 Sec. 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 judgment 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 control.

- Obtain an understanding of internal control relevant to the audit of the consolidated financial statements and of arrangements and measures (systems) relevant to the audit of the 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 the executive directors and the reasonableness of estimates made by the executive directors and related disclosures.
- Conclude on the appropriateness of the executive directors' use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in the auditor's report to the related disclosures in the consolidated financial statements and in the 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 Sec. 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 audit 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 the executive directors in the group management report. On the basis of sufficient appropriate audit evidence we evaluate, in particular, the significant assumptions used by the executive directors as a basis for the prospective information, and evaluate the proper derivation of the prospective information from these assumptions. We do not express a separate opinion on the prospective information and on the assumptions used as a basis. There is a substantial unavoidable risk that future events will differ materially from the prospective information.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Eschborn/Frankfurt am Main, 10 March 2023

Ernst & Young GmbH

Wirtschaftsprüfungsgesellschaft

Bösser
Wirtschaftsprüfer
[German Public Auditor]

But
Wirtschaftsprüfer
[German Public Auditor]

Multi-year overview

	2022	2021	2020	2019	2018
Financial performance (€ million)					
Revenue excluding precious metals	2,900	2,272	2,052	2,200	2,259
Total revenue	29,082	29,506	31,532	21,570	20,295
Earnings before interest, tax, depreciation, amortization, and impairment (EBITDA)	949	714	502	407	484
Earnings before interest and tax (EBIT)	688	524	302	222	341
Profit before taxes (EBT)	677	496	263	158	286
Profit after taxes	499	369	191	115	197
Financial position (€ million)					
Total assets	7,129	6,994	5,915	5,497	5,068
Shareholders' equity	4,533	3,801	3,280	3,293	3,223
Equity-to-assets ratio (%)	64	54	56	60	64
Cash flow (€ million)					
Net cash provided by operating activities	692	608	345	378	449
Cash payments for investments in non-current assets	288	248	197	233	257
Depreciation, amortization, and impairment of non-current assets	233	168	176	158	143
Employees					
Employees at year-end	15,938	15,114	13,911	14,190	13,858
In Germany	5,375	5,149	5,290	5,464	5,418
Outside Germany	10,563	9,965	8,621	8,726	8,440

Legal notice**Publisher**

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This financial report contains the full consolidated financial statements and group management report of Heraeus Holding GmbH, Hanau, for 2022 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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