VESUVIUS PLC

Annual Report
2023

AR2023

Focusing on technology

Creating value for our customers

We think beyond today's solutions and shape the future through innovation.

Our purpose

Vesuvius is a global leader in molten metal flow engineering and technology, serving process industries operating in challenging high-temperature conditions.

We think beyond today to create the innovative solutions that will shape the future, delivering products and services that help our customers make their industrial processes safer, more efficient and more sustainable.

In turn, we provide our employees with a safe workplace where they are recognised, developed and properly rewarded, and aim to deliver sustainable, profitable growth to provide our shareholders with a superior return on their investment.

Contents

Financial highlights

Revenue
£m

£1,930m

23	1,930
22	2,047
21	1,643

Trading profit[1]
£m

£200m

23	200
22	227
21	142

Return on sales[1]
%

10.4%

23	10.4
22	11.1
21	8.7

Operating profit
£m

£190m

23	190
22	217
21	133

Statutory EPS
p

44.0p

23	44.0
22	67.2
21	37.7

Free cash flow[1]
£m

£128m

23	128
22	123
21	-0.3

1. For definitions of alternative performance measures, refer to Note 35 of the Group Financial Statements.

Non-financial highlights

Lost Time Injury Frequency Rate

0.6

23	0.6
22	1.08
21	1.06

Total R&D spend[1]
£m

£37m

23	37
22	36
21	31

Female representation in the Senior Leadership Group %

20%

23	
22	20
21	19

Reduction of Scope 1 and Scope 2 CO_2e emission intensity per metric tonne of product packed for shipment versus 2019[2] %

-20.2%

23	-20.2[3]
22	-18.5
21	-16.0

1. At constant 2023 currency.
2. Re-baselined using pre-acquisition data for the business acquired from Universal Refractories, Inc. (Vesuvius Penn Corporation), and BMC (Yingkou YingWei Magnesium Co., Ltd).
3. Pro forma: performance as if the dolime process had been operating normally in 2023.

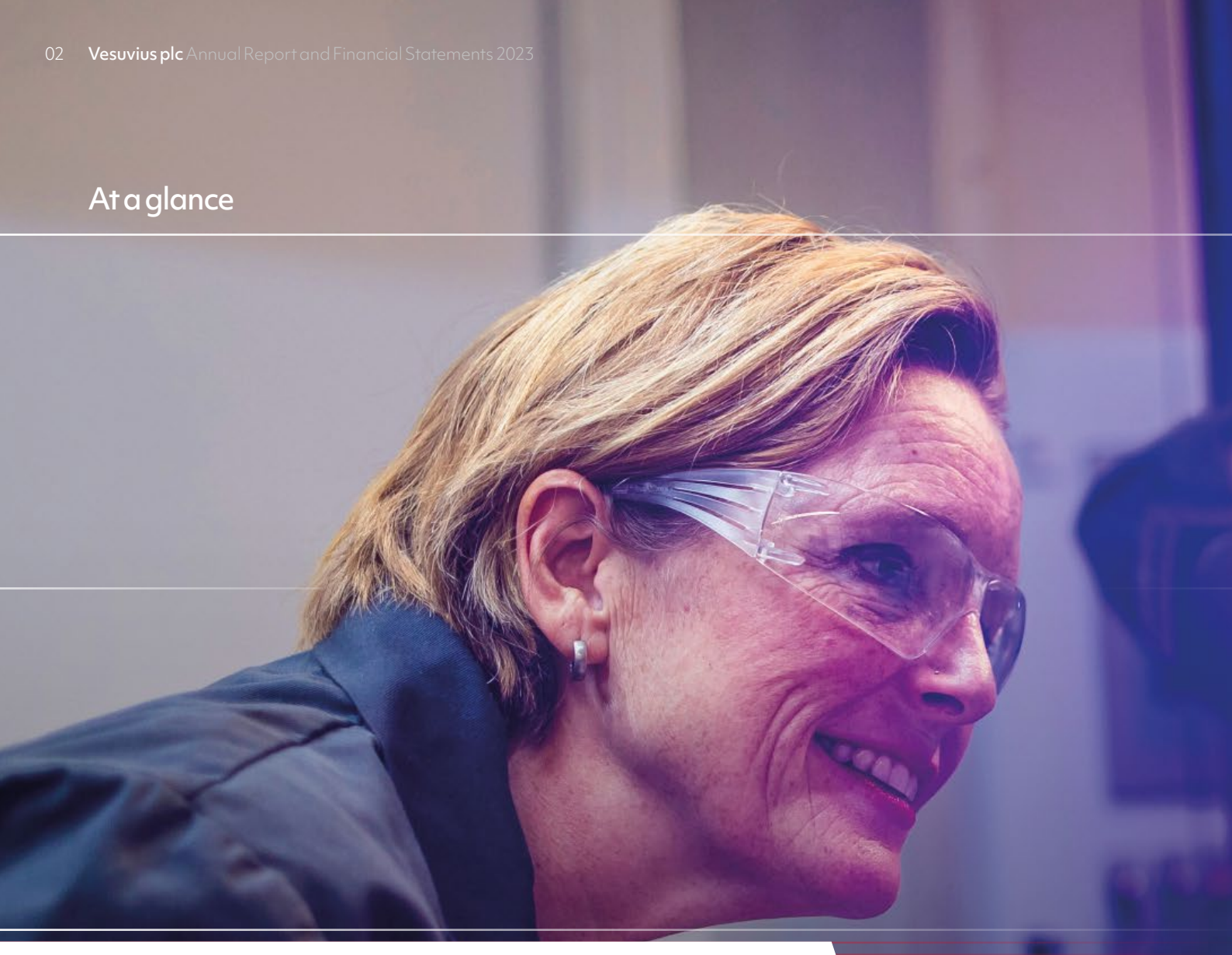
Forward-looking statements

This Annual Report contains certain forward-looking statements which may include reference to one or more of the following: with respect to operations, strategy, performance, financial condition, financing plans, cash flows, capital and other expenditures and growth opportunities of the Vesuvius Group. Forward-looking statements can be identified by the use of terminology such as 'target' 'intend', 'aim', 'project', 'anticipate', 'estimate', 'plan', 'believe', 'expect', 'forecasts', 'may', 'could', 'should', 'will' or similar words.

Although the Company makes such statements based on assumptions that it believes to be reasonable, by their nature, these statements involve uncertainty and are based on assumptions and involve risks, uncertainties and other factors that could cause actual results and developments to differ materially from those implied by the forward-looking statements anticipated. Such forward looking statements should, therefore, be considered in light of various important factors that could cause actual results to differ materially from estimates or projections contained in the forward looking statements.

The forward-looking statements reflect knowledge and information available at the date of preparation of this Annual Report and, other than in accordance with its legal and regulatory obligations, the Company undertakes no obligation to update these forward-looking statements. Nothing in this Annual Report should be construed as a profit forecast or a guarantee of the Vesuvius Group's future performance.

At a glance



Vesuvius is a specialist provider of high technology products and solutions to industrial customers who operate in challenging high-temperature conditions

Our customers are predominantly in the steel and foundry industries which we serve from our two Divisions. Our technology-led products allow our customers to tackle some of the most complex problems in their production processes.

Our world-leading R&D supports the consistent delivery of our high-tech consumables. Our sales are not dependent on the capex cycles of our customers, and our products create value by improving...

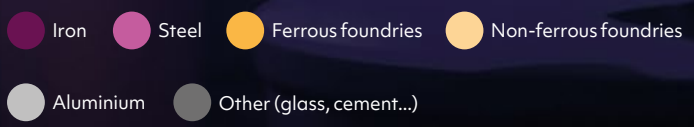
Safety
Improved safety at customer plants

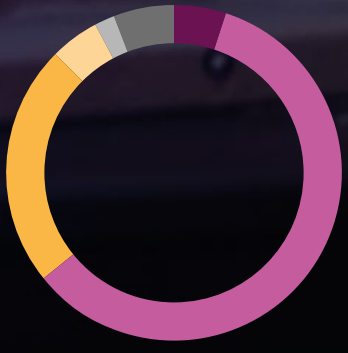
Quality
Better steel, better castings

Efficiency
Cheaper steel, cheaper castings

Sustainability
Less energy usage and fewer CO_2 emissions in steel and foundry processes

Sales by customer activity





At a glance continued

OUR DIVISIONS

Steel

Vesuvius is a world leader in the supply of refractory products, systems and solutions to steel producers and other high-temperature industries. We help our customers increase their efficiency and productivity, enhance quality, improve safety and reduce their costs and their environmental impact.

Flow Control

Revenue: £793m

Supplies the global steel industry with consumable ceramic products, systems, robotics, digital services and technical products for the continuous casting process

Advanced Refractories

Revenue: £568m

Supplies specialist refractory products designed to enable steel-making equipment, such as Electric Arc Furnaces and Basic Oxygen Furnaces, to hold the molten metal

Sensors & Probes

Revenue: £39m

Provides a range of products that enhance the control and monitoring of our customers' production processes

What we do for our Steel customers

We supply refractory products, flow control systems and process measurement solutions to our Steel Division customers

We combine these with robotics and mechatronic installations to increase their efficiency, lower their costs and improve their safety and consistency

Our solutions address the key challenges of our customers in the steel industry, such as maintaining steel quality and reducing energy usage during the casting process

Our products and their applications preserve the purity of the steel as it moves through the production process, from initial refining to the cast steel slab, bar or ingot

Revenue £1,400m

The secret object #5 is a

At a glance continued

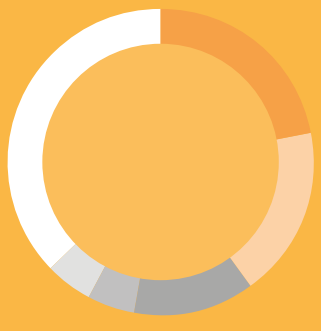
OUR DIVISIONS

Foundry

Vesuvius, operating under the Foseco brand, is a world leader in the supply of consumable products, technical advice and application support to the global foundry industry, improving casting quality and foundry efficiency. Our primary customers are ferrous and non-ferrous foundries serving various end-markets, from large bespoke castings to high-volume automotive pieces.

Diversified end-markets

Product demand in the Foundry Division is driven by higher sophistication, demanding higher quality metal and more complex casting across increasingly diversified end-markets



What we do for our Foundry customers

We provide customisable products and process technology to foundries that improve the quality of their castings

We combine this with technical advice, application engineering and computer modelling to improve process outcomes

Our solutions address our foundry customers' key challenges of casting quality and production efficiency

Our products and solutions clean the molten metal, improve the solidification of that metal, and reduce wastage in the final casting

Revenue £530m

At a glance continued

Production sites

R&D centres of excellence

Our global presence positions us well to take advantage of developing steel and foundry market dynamics

Our local manufacturing, local expertise and global knowledge of steel manufacturing processes gives us a special relationship with our customers.

6	40	68	6	55
Continents	Countries	Sales offices	R&D centres of excellence	Production sites

Breakdown by region

Americas
3,295 employees

20% Foundry
80% Steel

£695m
Revenue

EMEA
4,209 employees

32% Foundry
68% Steel

£670m
Revenue

Asia-Pacific
3,

32%
68%

£566m
Revenue

The secret transportation is an

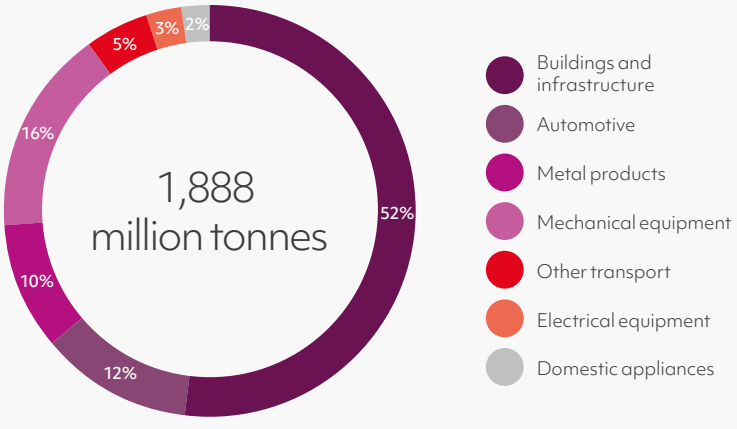
Our market environment: positive growth trends

Steel manufacturing is our principal market, and demand for steel is growing due to population expansion in emerging markets and infrastructure investment globally

Steel is the world's most important engineering and construction material

Steel is principally used for construction, infrastructure, automotive manufacture and domestic goods.

Amount of steel used in the world in 2023

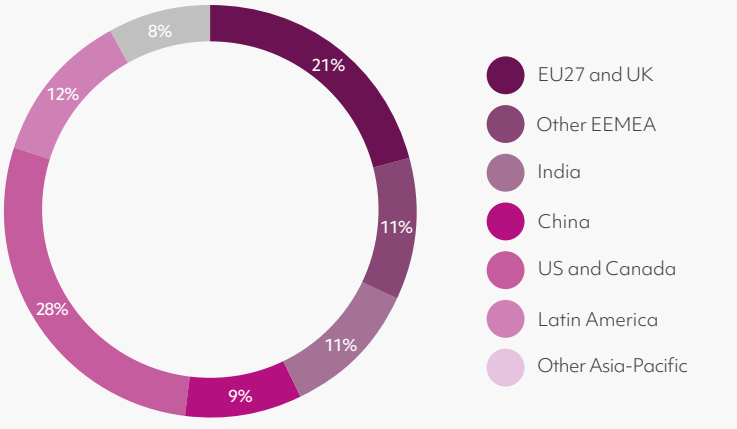


Source: World Steel Association.

We have global exposure with under half our revenue generated from the mature markets of North America and Europe. We have a strong and growing position in India and other emerging markets.

China represents only 9% of our revenue due to our focus on steel manufactured using high-tech processes, but we are well placed to respond to an expected growth in high-tech steel in China in the coming years.

Our global exposure



Source: Company analysis.

Developments in steel markets

Positive growth in steel markets outside China

We believe steel markets are now at an inflection point. Over the past ten years most of the growth of the steel market has been concentrated in China where Vesuvius realises only around 10% of its sales.

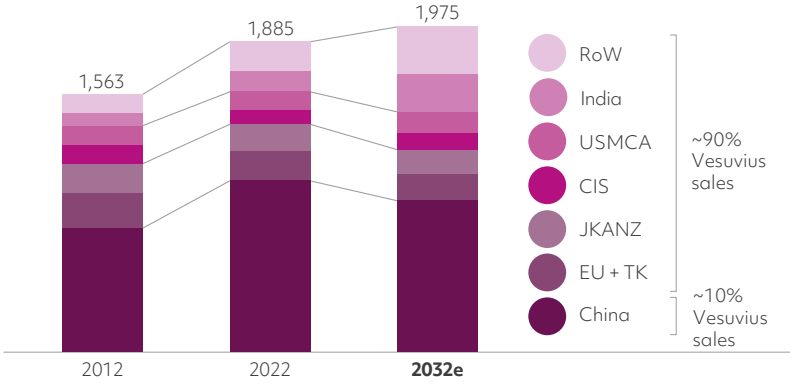
We believe the market dynamics of the next ten years will be very different, due to the fast development of India and, to a lesser extent, of South East Asia, Middle East, Africa and Latin America.

The decarbonisation of western economies, which will require very significant incremental amounts of steel, will also support steel consumption in the world outside China. The Inflation Reduction Act in the US could increase annual US steel consumption by close to 5%.

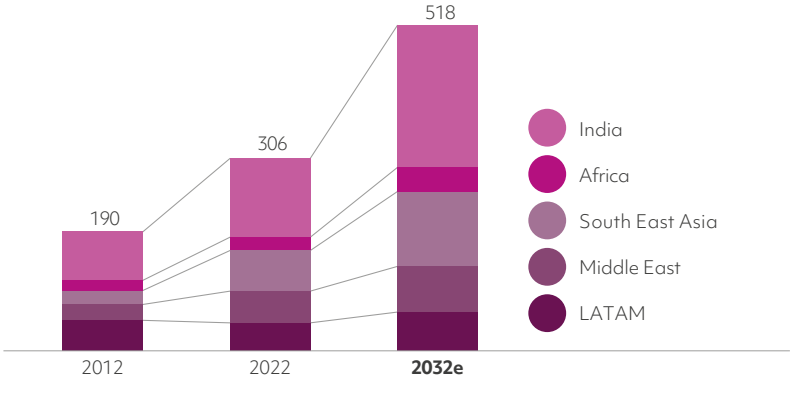
Based on estimates from the World Steel Association and Laplace Conseil, we believe that steel production outside China will increase by at least 200 million tonnes, or around 25%, over the next ten years, half of it in India. This estimate may be conservative with ArcelorMittal estimating demand for an additional 300 million tonnes of steel (outside China) over the next ten years.

Vesuvius' recent production capacity expansions in India, Eastern Europe and Mexico will position the Group well to benefit from these changes in the steel market.

Expected evolution of global steel production (2012–2032e), *million tonnes*



Expected growth in steel production in emerging markets (2012–2032e), *million tonnes*



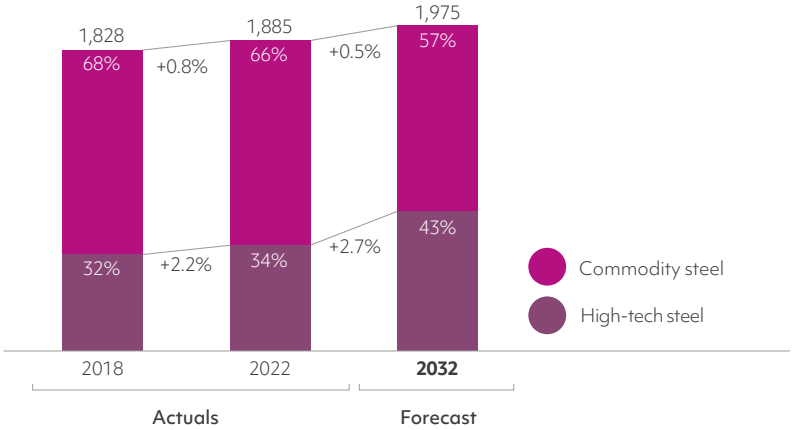
Source: World Steel Association (Yearbook 2022 published March 2023) and Laplace Conseil (analysis conducted in October 2023, including inputs from World Bank, IMF, IEA, OECD & other international associates, company data and announcements).

High-tech steel is expected to grow faster than the market

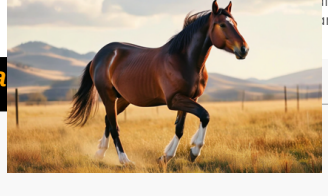
Our Flow Control Business Unit will also benefit from the progressive evolution of the steel sector, not only in China but worldwide, towards more technology intensive types of steel, either because this steel is being produced through sophisticated processes like thin slab casting or because it is destined for highly demanding end-markets like automotive, engineering or energy.

It is estimated that the 'high-technology' steel sector, representing around 34% of the steel market today, could represent around 43% of the global steel market in ten years' time. Flow Control already realises 58% of its sales in this fastest growing part of the steel market.

High-technology steel production evolution, *million tonnes %*



Source: World Steel Association (Yearbook 2022 published March 2023) and Laplace Conseil (analysis ling inputs from World Bank, IMF, IEA, OECD Global Energy Monitor nd other international associates, company data and announcements).



Our market environment: positive growth trends continued

The Foundry Division serves a wide range of growing end-markets including, machinery and general engineering, mining, agriculture and infrastructure

End uses of foundry castings

Products manufactured by the foundry casting market – made up of iron casting, steel casting and non-ferrous casting – are used across all engineering sectors.

	Foundry Sales (2023)	Example cast parts
Light vehicles	22%	– Engine components and exhaust systems (ICEs and hybrids) – Electric engine components (hybrids and EVs)
Mining and construction	18%	– Mining vehicle components and mining machinery – Structural support in infrastructure – Functional elements in construction , e.g. roofing, stairs, doors and window frames
Medium and heavy vehicles	13%	– Suspension, chassis and brake components
Railways and Marine	5%	– Wheels, axles, frames and chassis for trains – Hulls, decks, propellers, anchor and chains for ships – Engine components
Power generation	5%	– Wind turbines – materials in tower structure, gearbox housing – Structural and rotating components
General engineering/ other	37%	– Agricultural components, including cultivating and harvesting equipment – Structural components for industrial machines – Rotating components – gears and shafts used in machinery

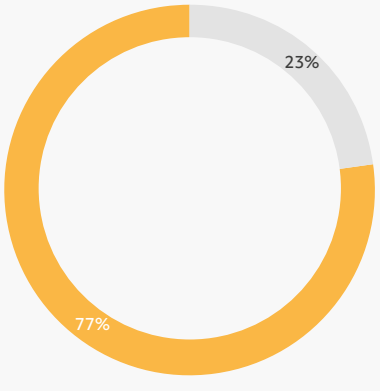
Foundry sales to end-markets

Foundry end-markets are expected to grow

More than three-quarters of the Foundry Division's sales are to markets that are forecast to see c.2% growth in average volumes per year over the next ten years.

Due to the gradual electrification of vehicles, the light vehicle market, which currently represents only 23% of the Foundry Division's sales, is expected to remain stable.

The Foundry Division's R&D strategy is focused on developing new technological products to accelerate its penetration of the growing aluminium casting sector for the automotive market, which is positively impacted by the electrification of vehicles, which we believe will enable the Division to continue to grow in the light vehicle sector.



77% of Vesuvius Foundry sales are in markets with forecast positive volume growth of 2% CAGR

23% of Vesuvius Foundry sales are in markets with flat volume growth (due to electrification)

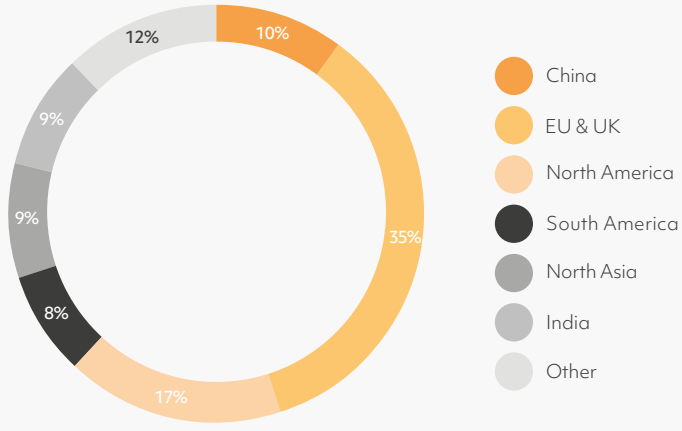
Mitigation

Accelerated penetration of non-ferrous castings for automotive with new technological products

Foundry's Global exposure

Ferrous sales in developed markets represent the core of the Foundry Division's business. We are witnessing the transition of ferrous casting activity from Western Europe towards emerging markets. We expect this strong growth to continue and we are focused on expanding our business in these developing markets. We are well positioned to respond to this transition from our network of existing manufacturing facilities.

Our global exposure



Foundry's customers

The Foundry market is highly fragmented with three main customer segments. The Foundry Division has more than 3,000 customers with no one customer representing more than 3% of Foundry's revenue.

Vesuvius segmentation and commentary

The captive

- Controlled by OEMs, who produce in-house where there is a technological edge vs. outsourcing

Large run/series
(>1,000pcs/yr even up to >100kpcs/yr in Automotive)

(20%)
2023 sales

End-markets

Mainly consists of mining, agriculture and light vehicle foundries

The specialist

- Focused on a limited number of markets (mining, automotive, windmill)

(53%)
2023 sales

Typically light vehicle and truck tier 2 suppliers who produce a small range of castings for various end users

The jobbing

- Produce a range of products on request
- Process and artisanal capabilities

Small runs/series
(5-100spcs/yr)

(27%)
2023 sales

Small accounts with one-off production runs, active across all sectors

Chairman's statement

"Our technological leadership continues to deliver innovative solutions and underpins our confidence in the future."

Carl-Peter Forster
Chairman

Dear Shareholders,

2023 was a year of successes for Vesuvius despite facing a number of global challenges. Against a backdrop of continuing macroeconomic uncertainty, we delivered a strong performance and emerged from 2023 having reinforced our technology-based strategy for continued growth. This performance was in large part due to the decisive actions of the Group's management team and senior leadership, as well as the hard work and commitment from our employees across the globe.

Our value proposition

Having joined the Board over a year ago, it is clear to me that our performance in 2023 is a direct result of the value that Vesuvius is able to provide to its customers. We outlined our strategy for continuing this partnership in our Capital Markets Day in November. The foundation of our business model is our R&D strategy, generating the new, high-technology consumables that deliver value to our Steel and Foundry customers, support our superior pricing capability and enable us to achieve market share gains. Through our solutions-driven offering, our customers can drive efficiency and productivity improvements in their processes, and make their operations safer and more sustainable. Our proprietary refractory solutions have set industry benchmarks, enabling our customers to produce cleaner, stronger, and higher quality steel and castings.

Our relentless focus on improving safety standards is central to Vesuvius, and we continue to invest in developing cutting-edge technology to minimise risks both for our own employees in our operations as well as our customers' employees in theirs. Our innovative focus on using robots to automate elements of the steel-making process which were previously done manually, minimises the need for our customers' employees to operate in hazardous environments.

Our commitment to support customers in their mission to improve product quality is a fundamental part of our solutions driven approach. Alongside this, we maintain a critical focus on the quality of our own products and our own operations. This underpins the reliability that our customers demand of us, as they use our products in critical and demanding processes, where quality cannot be compromised. 2023 has seen a renewed focus within Vesuvius on continuing to strengthen the quality of our solutions and consumables.

People

The strategic progress and financial performance we delivered in 2023 is founded on the dedication and professionalism of our employees across the Group. The level of technological innovation we generate could not happen without our exceptional teams of R&D professionals and industry experts, nor could we maintain the depth of our customer relationships without the contribution of our operations, sales and procurement teams. People are at the heart of Vesuvius, and we continue to focus on how we can invest in our teams to deliver our commercial ambitions.

Members of the Board had a busy year in 2023, visiting sites in Brazil, China, Germany, India, the Netherlands and the United States. It is during these visits that the Directors can speak first-hand with our people, hold 'town hall' meetings, listen to their questions and feedback, and take the temperature of the organisation. The optimism I had about the quality of the staff across Vesuvius has been borne out in my first year as Chairman, as I have travelled to sites and had the opportunity to hear the views and opinions of our excellent teams around the globe.

Safety

The number one priority at Vesuvius is to provide our employees with a safe place to work. Only the highest levels of safety performance can be accepted, and we are proud of the steps we have taken over the years to ensure safety is at the core of everything we do. Although we are pleased that the Lost Time Injury Frequency Rate reduced significantly this year, we are aware that there is more work to be done, particularly in relation to the management of contractors, where we had two serious injuries on our sites in 2023.

Progress on our Sustainability objectives

The Group has set clear internal operational targets around sustainability performance, particularly in relation to our CO_2 emissions and energy consumption. We continue to make good progress in the reduction of our carbon footprint and are proud that our latest Sustainalytics score was upgraded for the third year in a row, putting the Group in the top quintile versus our peers.

We have continued to focus on developing products across our portfolio which deliver improved environmental performance, and play a key role in the value that we create for our customers. In my site visits around the business I have seen how our people are engaged in delivering on our global sustainability objectives, together with focusing on local initiatives that benefit the communities in which they work.

We continue to make steady progress towards reaching our target of a net zero carbon footprint by 2050 at the latest. Achieving this ambition will require capital investment, and the development and adoption of new production technologies. However, we have clear priorities, targets and milestones identified as we progress on this journey and are dedicated to achieving this important goal.

The Board and governance

In 2023, we had a number of changes to the Board. We welcomed Carla Bailo, Mark Collis and Robert MacLeod and saw Jane Hinkley and Guy Young leave the Board.

Having served nine years on the Board, Douglas Hurt, Senior Independent Director, will be stepping down at this year's AGM, and we are pleased that Eva Lindqvist has agreed to join the Board as our new Senior Independent Director. She will be standing for election at the AGM. Eva is an engineer with more than 35 years' experience in global industrial and service businesses, and I know she will be a valuable addition to the Board.

On behalf of the Board, I would like to thank Douglas Hurt for his dedicated service, wise counsel and exceptional support over the years.

As in previous years, the Board conducted an evaluation of its performance in 2023, full details of which are set out in the Nomination Committee report. This process has again enabled us to reflect positively on the Board's role in adding value to the business as it pursues its strategic and operational objectives.

Dividend

The Vesuvius dividend policy aims to deliver long-term dividend growth, via a progressive dividend, provided this is supported by cash flow and underlying earnings, and is justified in the context of our capital expenditure requirements and the prevailing market outlook.

The Board has recommended a final dividend of 16.2 pence, bringing the total dividend for the year to 23.0 pence per share, which is a 3.4% year-on-year increase on the total dividend for 2022 of 22.25 pence per share. This represents a dividend cover of 2.0x compared to adjusted EPS for 2023.

If approved at the Annual General Meeting, this final dividend will be paid on 31 May 2024 to shareholders on the register at 19 April 2024.

On 4 December 2023, we launched a share buyback of up to £50m, which is expected to take 9–12 months to complete. This is part of our commitment to return cash to shareholders where it is not required for additional investment, while maintaining a strong and prudent balance sheet. During 2023, shares with a value of £3.1m were acquired (at an average price of 464 pence per share) and cancelled by the Company.

Annual General Meeting

The Annual General Meeting will be held on 15 May 2024. The Notice of Meeting and explanatory notes containing details of the resolutions to be put to the meeting accompany this Annual Report and are available on our website: www.vesuvius.com.

Looking ahead

Vesuvius has a clear strategy for growth and is well placed to deliver superior returns to our shareholders. In the months and years ahead, we will focus on delivering our strategic ambitions. We will continue to prioritise safety, drive innovation through our dedicated R&D capabilities, and deliver market-leading, technologically advanced products and solutions. We will drive efficiency in our operations and maintain a robust financial framework to support investment in the business, and where appropriate, acquisitions. The year ahead will no doubt present challenges, but I am confident we have the people, products and expertise to navigate these, and continue on our path of creating value for shareholders and delivering long-term sustainable growth.

On behalf of the Board, I would like to thank our shareholders, employees and customers for their continued support, and I look forward to reporting on further successes in the coming year.

Carl-Peter Forster
Chairman
28 February 2024

Chief Executive's strategic review

"Resilient results despite a challenging trading environment. Top line and profitability growth initiatives fully on track."

Patrick André
Chief Executive

Our ambitions

In November 2023, we presented our strategy and medium-term targets to investors at our Capital Markets Event. We highlighted favourable medium-term trends in our end-markets, and, through our market-leading investment in research and development, demonstrated our ability to gain market share while pricing for the value we generate for our customers. We also set out a cost reduction programme to achieve £30m of annually recurring cost savings in 2026. This programme will cover all our activities worldwide and will focus on operational improvement, lean initiatives, automation and digitalisation as well as further optimisation of our manufacturing footprint. We remain very optimistic about the future of Vesuvius, with ambitious plans for the next three years.

Our performance in 2023

In 2023, we delivered very resilient results and profitability despite a difficult market environment, and we continued to make good progress in the implementation of our strategic top line and profitability growth initiatives.

Our steel markets, after some limited improvement during H1 2023 from the very low level of H2 2022, weakened again during H2 2023. This was particularly pronounced in Europe (EU+UK) where steel production declined 7.3% in 2023 as compared with the previous year, 5% below the worst year of the pandemic in 2020. Steel markets were also particularly difficult in South America, where production declined 5.8% as compared with the previous year. India was, in 2023, for the second year in a row, the only major region in the world to exhibit a strong growth of 11.8%. Steel production in China was stable, but Chinese net steel exports increased very significantly during the year, putting pressure on all steel producers outside China, with the exception of those in the US who were insulated by efficient trade protections. Overall, steel production in the world excluding China, Russia, Iran and Ukraine declined by 0.7% in 2023, after a decline of 3.9% in 2022.

Our foundry markets, with the exception of India, also remained weak in 2023, particularly in Europe (specifically in and around Germany), in China and in South America. Weakness in non-automotive sectors more than offset a limited recovery in the automotive sector. Destocking of the excess casting inventories accumulated during the pandemic also had a negative impact on our end-markets.

Our Strategic Targets

Background

Positive medium-term market dynamics

There are positive growth trends in both the steel and foundry markets. A positive inflection in the volume growth of the steel market outside China is widely expected and this will change the trend seen over the past 10–15 years of market decline outside China.

This change is evidenced by new investment in steel plant capacity by the world's major steel makers. While the near-term outlook can sometimes be uncertain, we expect to have a tailwind of growing markets in the medium term.

We will focus on leveraging our technological differentiation to outperform growing end-markets.

The core of our strategy is creating technologically differentiated products and solutions through market-leading R&D investment, and then commercialising this benefit.

This is validated by the success we have achieved to date. Revenue from our Steel business grew 30% in the five years between 2017 and 2022 despite our addressable market decreasing by 18% over the same period.

We aim to:

1

Achieve a Return on Sales of at least 12.5%, by 2026

This will be delivered through revenue growth supported by market share gains and pricing improvements from our differentiated products, plus a further cost saving programme to deliver £30m of savings in 2026, driven by the benefits of automation and digitalisation.

2

Generate strong and recurring free cash flow of at least £400m between 2024 and 2026

This is possible due to our asset-light business model, our disciplined approach to capital investment and a focus on optimising working capital.

The resulting cash generated will be returned to shareholders unless required for acquisitions, which we undertake on a highly selective basis.

3

Achieve £30m of annually recurring costs savings by the end of 2026

This programme will cover all our activities worldwide and will focus on operational improvement, lean initiatives, automation and digitalisation as well as further optimisation of our manufacturing footprint.

Our capital allocation priorities

Organic investment

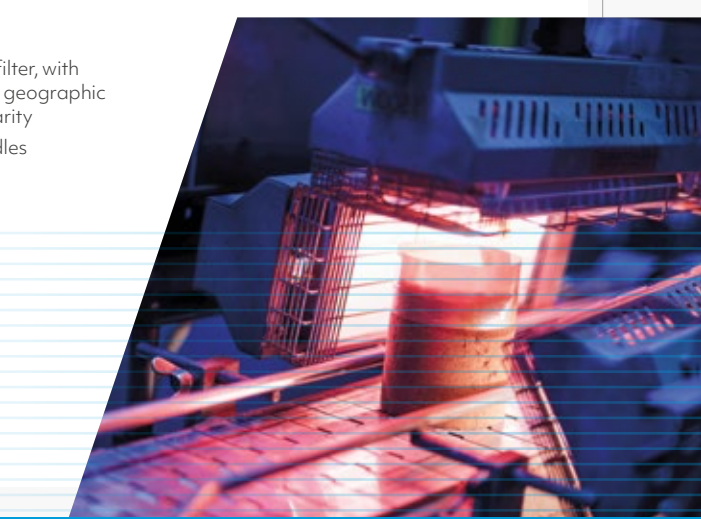
- Consistent and targeted R&D expenditure of c.2% of revenue per annum
- Capex expected to return to sustaining levels in 2025

Shareholder returns

- Long-term dividend growth via a progressive dividend
- Focus on maintaining a prudent balance sheet (c.1.0-2.0x net debt/EBITDA)
- Surplus capital available for additional shareholder returns

Inorganic investment

- Highly selective acquisition filter, with strategic factors focused on geographic or technology complementarity
- Very stringent financial hurdles for investment



Chief Executive's strategic review continued

Robust results and profitability thanks to positive pricing performance in all Business Units and market share gains in Flow Control and Foundry

Both the Steel and Foundry Divisions achieved positive pricing performance in 2023, sharing the value we create for our customers through our technology leading products and solutions and fully compensating for increases in our cost base from the c
inflationary environme

At the same time, both the Flow Control and the Foundry Business Units continued to gain market share in most regions, with the exception of Europe (EU+UK) for Flow Control where the Business Unit was negatively impacted by destocking at certain key customers and where we applied strict credit limit rules limiting our sales to customers at heightened risk of insolvency.

This ability to simultaneously improve market share and prices in both Flow Control and Foundry was again made possible by the technological differentiation of our products and solutions, driven by our market-leading investment in research and development.

In the Advanced Refractories Business Unit however, we lost market share in 2023, particularly in Europe, as we gave priority to pricing.

Thanks to this overall positive pricing performance and to our market share gains in Flow Control and Foundry, we delivered resilient results in 2023 despite the very challenging market environment. Our revenue reached £1,930m (versus £2,047m in 2022), our trading profit reached £200m (versus £227m in 2022) resulting in a return on sales of 10.4% (versus 11.1% in 2022), demonstrating again the positive impact of our cost competitiveness and technology strategy.

Successful implementation of our growth generating investment programme in Flow Control and Asia

The growth-generating investment programme we initiated in 2021 continues apace and will support the progression of our results and profitability in the years to come. The expansion of our VISO, slide-gate and mould flux production capacity in Flow Control will be fully operational by mid-2024 and will support the Business Unit's expansion in India, South East Asia, EEMEA and North America. In China, our new Foundry flux production line is now fully operational and will enable the Business Unit to accelerate its penetration of the fast-growing aluminium foundry market in the country. In Advanced Refractories, the expansion of our basic monolithics, AlSi monolithics and precast capacity at our new flagship plant in Vizag, India will be completed by the end of 2024 and will support the profitable growth of the Business Unit in India and South East Asia.

Stro
management
ss in the
rking capital, our cash conversion ratio reached 93% in 2023. This enabled us to maintain a very low debt leverage ratio of 0.9x, despite our capital expenditure being temporarily higher than the long-term average, to increase our dividend and to launch a £50m share buyback programme at the end of 2023.

Our free cash flow generation is expected to improve further from 2025, when our strategic expansion programme will be complete and capex should return to a more normalised level.

Continued progress in the productivity of R&D and new product development

We again increased our investment in research and development in 2023, spending £37.4m, an uplift of 3.7% over 2022 (on a constant currency basis). This was fully expensed in our profit and loss statement. Our two main focus areas remain: innovation in materials science, with an objective to continuously improve the performance of our consumables; and, the development of mechatronics solutions to enable our customers to substitute the operators who manipulate our consumables, with robots and by doing so improve the safety, reliability, cost and quality performance.

We successfully launched 21 new products in 2023. Our New Product Sales ratio, defined as the percentage of our sales realised with products which didn't exist five years ago, reached 17.6%, up from 16.4% in 2022.

Thanks to the continuous efforts we are putting into R&D, we now have a full pipeline of products under development which will be progressively introduced to the market over the next three years to support our ambition to grow our top line and profitability.

Best ever safety performance

We achieved our best ever safety results in 2023 with a Lost Time Incident Frequency Rate of 0.6 vs 1.08 in 2022, which now positions us amongst the 'best in class' companies worldwide. This is the result of many years of effort to integrate safety as the number one priority in our company culture. Our ultimate goal remains for us to be a zero-accident company and we will intensify our efforts to continue progressing rapidly towards this objective.

Our journey to net zero

In 2023, we continued to implement our action plan to decarbonise our activities. In particular, we reinforced our energy savings initiatives and continued our programme to switch our electricity consumption worldwide to non-carbon emitting sources. Thanks to these efforts, we reduced our carbon intensity by 20.2% vs our 2019 reference year (18.5% reduction in 2022), achieving our 2025 objective two years ahead of schedule and setting us on track to achieve our next intermediate target of a 50% reduction by 2035.

Cyber update

On 6 February 2023, we announced that we had suffered a major cyber security incident. Thanks to the protective measures the Group had implemented in prior years, there was no disruption of supply to customers, and the overall cost of the incident was limited to £3.5m. We have analysed the event in detail and derived the necessary learnings. This has enabled us to improve our protection further to help minimise both the risk and severity of any subsequent incidents.

On track to achieve our mid-term growth and profitability objectives

Despite the short-term uncertainties in our steel and foundry end-markets, we remain confident in their mid- to long-term growth potential, and in particular growth in the steel market outside China, which should be a tailwind for Vesuvius.

The strength of our technology-based business model should also enable us to continue to simultaneously outperform our underlying markets in Flow Control and Foundry and maintain positive pricing performance for all our Business Units in the years to come. This, coupled with our relentless drive to optimise our cost base, as illustrated by the launch of our new cost optimisation programme, positions us well to achieve our objectives of a 12.5% return on sales by 2026 and cash flow generation of £400m over the next three years.

Patrick André
Chief Executive
28 February 2024

Investment proposition

Principal reasons to invest

We offer a compelling investment proposition with exciting potential for profit and cash generation

Vesuvius operates in growing markets

We believe that the steel market is inflecting to growth in the world outside China, where we earn more than 90% of our revenue. At the same time, there is a global move toward technical steel products and consumption, where our Flow Control sales are strongly weighted. Our Foundry markets are also expected to grow.

We have a global presence

Our worldwide footprint, particularly in the world's fastest growing markets, enables us to deliver on safety, quality, sustainability and value across all of the world's steel-making and foundry casting regions.

Vesuvius has a technology-based strategy

We spend c.2% of our annual revenue on R&D, allowing us to maintain strong technological differentiation in our products. Our investment in R&D is measured by our percentage of New Product Sales, and we aim to realise 20% of our sales annually from products which didn't exist five years ago.

Superior technology drives financial outperformance

We expect to outperform underlying markets by on average 2% per annum, using our technology leadership to gain market share, optimise pricing, and share the value we generate for our customers. Refractories only represent c.3% of the production costs of our customers.

We have a strong sustainability strategy

We aim to help customers reduce their environmental impact in addition to delivering on our own challenging targets for safety, carbon intensity reduction, gender diversity and other measures.

The secret object #4 is a

...nd recurring free cash flow

Our business model delivers consistent cash flow due to our low capital intensity, high level of recurring revenue, and the underpin of working capital discipline. This cash flow will be available for further investment or return to shareholders.

Our business model

Why invest in Vesuvius? | Strategic framework | How we will achieve this

Our markets

Positive growth trends in steel and foundry markets

Our resources

Decentralised, entrepreneurial, non-matrix organisation

55
55 production sites on 6 continents

6
R&D centres of excellence

13,500
people in our skilled and motivated workforce

Our Values

- Courage
- Ownership
- Respect
- Energy

Financial capital

We use the cash generated by our business to invest in innovation, people, operating assets, technology and sales to generate further growth

Global supply network

We work closely with a wide range of suppliers to establish reliable and well-developed sustainable supply chains to secure high-quality raw materials

What we are doing

1 Technological leadership and product differentiation through investment in R&D

Our network of talented scientists and technicians create differentiated products and solutions, maintaining our technology leadership

Link to page 22

2 Customer service

Our customer intimacy and deep knowledge of their processes and requirements give our engineers an unparalleled ability to deliver on customer needs

Link to page 23

3 Efficient operations

Our continuous focus on improvements in our manufacturing base, production processes and IT and support functions maintains the efficiency of our operations

Link to page 23

4 Investment in growth regions

Our global footprint enables us to capitalise on shifting dynamics in the global steel market

Link to page 23

Underpinned by a strong sustainability strategy

Link to page 34

Creating value

Safety
Better environments and outcomes for Vesuvius staff and customers

Quality
Optimised products driving better steel, and better castings

Efficiency
Cheaper casting and steel through reduction of input costs

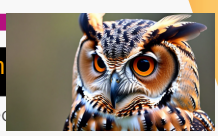
Sustainability
Less energy usage and fewer CO_2 emissions in our processes and our customers' processes

Rewarding careers
We encourage and reward high performance to create an environment where all can realise their individual potential

Return for investors
Optimised pricing and market share gains driving improved profitability

Steel

The secret animal #3 is an



Advanced

Link to page 4

Foundry

Link to page 6

To achieve

Outperform our underlying markets by ~ 2%

>12.5%
Return on sales in 2026

£30m
Recurring annual cost savings by 2026

£400m
free cash flow between 2024 and 2026

Our drivers for profitable growth

Why invest in Vesuvius? Strategic framework How we will achieve this

We have four strategic pillars which will help us achieve our financial targets. These are underpinned by our universal focus on safety, our investment in our people and our long-term sustainability strategy.

1 Technological leadership and product differentiation through investment in R&D

Leading R&D will underpin Vesuvius' growth in the next five years.

We have built up a global network of expert scientists, engineers and technicians, based across our six R&D centres of excellence, who combine product expertise with the provision of specialist support to our customers.

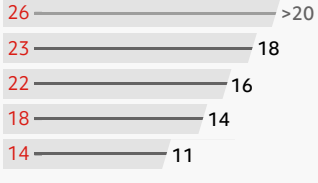
Our strategy of continual investment in R&D has resulted in a growing proportion of our sales being attributable to new products (those launched in the past five years). This is expected to exceed 20% by 2026.

c.250 scientists and technicians across 18 nationalities

R&D centres of excellence

New product sales ratio
%

2026 Target: >20%



Definition: new product sales (products launched in past five years) as a percentage of total sales. Source: Company analysis.

Optimised pricing and market share gains

Our strong technological leadership enables us to deliver pricing optimisation through a combination of (1) passing-through cost fluctuations and (2) value-sharing with customers.

The pass through of costs lowers our exposure to fluctuations in the raw material markets and reduces earnings volatility.

The trend towards more technically advanced steel and castings increases customers' demands for our differentiated products, providing further opportunities for us to share in the value that our solutions create.

Current product portfolio and profit analysis	Audit customer's process and product portfolio to estimate the current cost of ownership
New product performance evaluation	Develop and then trial a new solution to maximise value for the customer
Value-based pricing calculation	Optimise pricing based on superior value creation

Example:
Durasleeve* product (new VISO piece)

20% longer product life

Value creation to the customer of >20%

Agreed pricing on a value-sharing basis

* Trademark of the Vesuvius Group of companies, unregistered or registered in certain countries, used under licence.

The secret shape is a

2 Customer s

We provide on-site support to our customers, with Flow Control maintaining a continuous presence at our customers' sites.

This level of intimacy, together with our materials science, fluid and computer modelling expertise, enables us to provide high-quality, tailored solutions to our customers. These are supported where appropriate by industry leading mechatronics, to secure an ongoing revenue stream from our consumable products.

3 Efficient operations

We have identified an incremental £30m of annually recurring savings which we intend to realise in the next three years. The majority of these savings will be achieved through our lean and continuous improvement programmes, and through the automation and digitalisation of our manufacturing and administrative processes.

Lean and continuous improvement programmes

Automation and digitisation of manufacturing and administrative processes

c.75% benefit

Further optimisation of manufacturing footprint

c.25% benefit

4 Investment in growth regions

Our existing programme of growth capital expenditure will be completed in 2024, after which expenditure will return to more normalised levels.

In 2023, work continued on construction of our new flux plant in Vizag, India and on our new basic monolithics, AISi-monolithics and precast manufacturing plant on the same site. These investments, together with capacity expansions in other manufacturing sites will serve future growth in our key markets of India and South East Asia.

Support to above-market growth in Flow Control

- Expansion of VISO, slide-gate and flux capacity worldwide

Global expansion in India and South East Asia

- Investing in state-of-the-art new capacity in the high-growth Indian market
- Expanding capacity at existing Kolkata site and developing new site in Vizag
- VISO capacity
- Flux plant
- Basic Mono, AISI Mono and precast lines
- Foundry filters line
- Space for further investment

Operating review

Steel Division

Revenue

£1,400m

Trading profit

£148m

Vesuvius comprises two Divisions, Steel and Foundry. The Steel Division operates as three Business Units, Flow Control, Advanced Refractories and Sensors & Probes.

Changes described are versus 2022 on an underlying basis, excluding the impact of FX, unless otherwise noted. There were no acquisitions or disposals in 2023 and hence no adjustments were required.

Vesuvius' Steel Division reported revenues of £1,400.0m in 2023, a decrease of 3.7%, reflecting positive revenue growth of 0.6% in the Flow Control business despite the difficult market conditions. This was due to good pricing performance and market share gains in most markets. Advanced Refractories' revenue declined 9.4% in 2023, due to the prioritisation of pricing over volume in EMEA and the Americas, more than offsetting market share gains in Asia.

Revenue from Sensors & Probes was broadly flat due to market share gains offsetting market decline.

Steel Division trading profit reduced by 9.6% to £147.6m, due to the negative drop through impact of reduced volumes in the Division, partially compensated by a positive pricing performance enabling the Division's return on sales to contract only 70bps to 10.5%.

Steel Division	2023 (£m)	2022 (£m)	Change (%)	Underlying change (%)
Flow Control revenue	**793.0**	810.9	(2.2%)	0.6%
Advanced Refractories revenue	**567.9**	645.3	(12.0%)	(9.4%)
Sensors & Probes revenue	**39.1**	40.2	(2.8%)	(0.6%)
Total Steel Revenue	**1,400.0**	1,496.4	(6.4%)	(3.7%)
Total Steel Trading Profit	**147.6**	172.7	(14.6%)	(9.6%)
Total Steel Return on Sales	**10.5%**	11.5%	-100bps	-70bps

Flow Control

Revenue
£m

£793m

23	793
22	811
21	649

Pascal Genest
President, Flow Control

In 2023, revenue in the Group's Flow Control business increased by 0.6% year-on-year to £793.0m, driven by a strong pricing performance and overall market share gains, offset by market, destocking and customer-related volume declines.

In EMEA, revenue declined 6.2% compared to 2022, broadly in line with declines in steel production (in EMEA excluding Russia, Ukraine and Iran) of 5%. This comprised an out-performance in EEMEA (excluding Iran, Russia and Ukraine) where the steel market was broadly flat and where we gained market share, offset by volume declines higher than the steel market evolution in the EU+UK reflecting a combination of the weak market, destocking by our European customers and voluntary reduction of our sales to some customers at risk of insolvency.

Flow Control Revenue	2023 (£m)	2022 (£m)	Change (%)	Underlying change (%)
Americas	**317.8**	321.4	(1.1%)	1.3%
Europe, Middle East and Africa (EMEA)	**252.7**	275.4	(8.2%)	(6.2%)
Asia-Pacific	**222.4**	214.1	3.9%	8.7%
Total Flow Control Revenue	**793.0**	810.9	(2.2%)	0.6%

In the Americas, our underlying revenue grew 1.3% reflecting out-performance of the market in the US (volumes +1.1% against a market +0.2%) and in South America (stable sales volumes versus a declining market), and resilient pricing. This good performance was partly offset by challenges in Mexico, where a major customer in which we had a very strong market share ceased operations at the end of 2022.

In Asia Pacific, revenue grew 8.7%, driven by exceptionally strong sales volume growth in both India and China, materially exceeding market volume growth in these two countries. We also outperformed the market in South East Asia, with modest volume growth versus market volume declines of -6.5%.

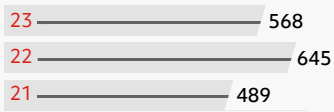
The secret object #2 is a

Operating review continued

Advanced Refractories

Revenue
£m

£568m



Richard Sykes
President, Advanced Refractories

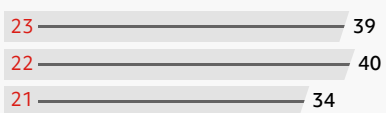
Advanced Refractories reported revenue of £567.9m in 2023, a decrease of 9.4%, principally reflecting volume declines, with overall stable pricing. Volume decline was higher than the underlying steel market in both the Americas and EMEA due to market share losses associated with priority having been given to pricing, and destocking in EMEA. Market share started to recover in EMEA in the second half. In Asia Pacific however, revenue grew 1.5% driven by double-digit volume increases in India and China, materially ahead of the market, partially offset by more difficult trading conditions in South East Asia.

Advanced Refractories Revenue	2023 (£m)	2022 (£m)	Change (%)	Underlying change (%)
Americas	**212.1**	244.5	(13.3%)	(11.5%)
Europe, Middle East and Africa (EMEA)	**191.5**	230.9	(17.0%)	(15.1%)
Asia-Pacific	**164.3**	169.9	(3.3%)	1.5%
Total Advanced Refractories Revenue	**567.9**	645.3	(12.0%)	(9.4%)

Steel Sensors & Probes

Revenue
£m

£39m



Davide Guarnieri
President, Steel Sensors & Probes

Revenue in Steel Sensors & Probes was £39.1m in 2023, broadly flat year-on-year, reflecting market share gains offsetting a declining market. We expect our sales volume in the coming years to continue to outperform the underlying steel market due in particular to an increased penetration in Asia where we have been performing several successful customer trials.

Steel Sensors & Probes Revenue	2023 (£m)	2022 (£m)	Change (%)	Underlying change (%)
Americas	**28.2**	29.1	(2.9%)	0.5%
Europe, Middle East and Africa (EMEA)	**10.2**	10.7	(5.0%)	(6.0%)
Asia-Pacific	**0.6**	0.4	77.8%	85.0%
Total Steel Sensors & Probes Revenue	**39.1**	40.2	(2.8%)	(0.6%)

Foundry Division

Revenue

£530m

Trading profit

£53m

Karena Cancilleri
President, Foundry

Vesuvius' Foundry Division reported revenues of £529.8m in 2023, a decrease of 1.5%, reflecting revenues contracting in EMEA and the Americas while expanding in Asia-Pacific. After a positive start to the year, trading was difficult in the second half due to significant market weakness in the northern part of EMEA (historically an important market area for our Foundry Division), in South America and in China. This market weakness was partially but not entirely compensated for by market share gains in all regions and a positive pricing performance. Foundry revenues in the Americas fell 5.8% year on year, driven by contraction in South America partially offset by modest growth in North America.

Foundry revenue	2023 (£m)	2022 (£m)	Change (%)	Underlying change (%)
Americas	**136.4**	145.5	(6.2%)	(5.8%)
Europe, Middle East and Africa (EMEA)	**215.1**	224.7	(4.3%)	(3.0%)
Asia-Pacific	**178.3**	180.8	(1.4%)	4.2%
Total Foundry Revenue	**529.8**	551.0	(3.8%)	(1.5%)
Total Foundry Trading Profit	**52.8**	54.5	(3.1%)	2.5%
Total Foundry Return on Sales	**10.0%**	9.9%	+10bps	+40bps

In EMEA, underlying revenue decreased by 3.0%, driven by a slowdown in Germany and more generally Northern Europe, as well as broader regional destocking. Performance in Asia was largely positive with revenue up 4.2%, reflecting very strong growth in India and market share gains in China, progressively increasing the relative importance of this region in the Foundry Division. This trend should continue in the coming years.

For the third year in succession, the Foundry Division delivered an increase in its return-on-sales. Trading profit increased 2.5% (on an underlying basis) to £52.8m and return-on-sales increased by 40bps to 10%. This improvement trend should accelerate when end-markets recover, especially in Northern Europe and South America.

Financial Key Performance Indicators

Financial KPIs[1]

Strategic Value alignment	KPI	Purpose	Link to remuneration
Return for Investors p21	**Underlying revenue growth** % 23 -3 22 18 21 18	Provides an important indicator of organic (like-for-like) growth of Group businesses between reporting periods. This measure eliminates the impact of exchange rates, acquisitions, disposals and sig	
	Return on sales % 23 10.4 22 11.1 21 8.7	Reflect margin achieved	
	Headline EPS p 23 46.7 22 56.5 21 35.3	Used to assess the underlying earnings performance of the Group as a whole	**Annual Incentive Plan and Vesuvius Share Plan** – Read more about these on p123-128
	Return on invested capital % 23 8.9 22 10.7 21 7.5	Used to assess the financial performance of the Group	**Annual Incentive Plan and Vesuvius Share Plan** – Read more about these on p123-128
	Free cash flow £m 23 128 22 123 21 -0.3	Used to assess the underlying cash generation of the Group	
	Average working capital to sales % 23 23.4 22 23.8 21 20.9	One of the factors driving the generation of free cash flow is the average working capital to sales ratio, which indicates the level of working capital used in the business	**Annual Incentive Plan** – Read more about this on p123, 126 and 127
Efficiency & Sustainability p21	**Total R&D spend** £m 23 37 22 36 21 31	At constant 2023 currency	
	New product sales % 23 18 22 16 21 15	Sales of products launched within the last five years as a % of total revenue	

1. For definitions of alternative performance measures, refer to Note 35 of the Group Financial Statements.

Details of the Group's **Non-financial KPIs** can be found in the **Non-financial and Sustainability Information Statement** on page 35.

Financial review

"Strong commercial performance counteracted challenging markets."

2023 performance overview

2023 was a robust year in terms of trading profit and return on sales, despite the depressed underlying markets, and we have continued to generate significant free cash flow. This has enabled the Board to recommend an attractive final dividend to our shareholders and initiate a share buy-back, while maintaining investment in strategic areas.

Revenue for the year decreased b of which 2.6% related to FX headw and 3.1% Underly a decline in volume (-5.5% partial offset by positive pricing of +2.3%). On a reported basis, the Steel and Foundry Division revenue decreased by 6.4% and 3.8% respectively in the year.

We achieved a trading profit of £200.4m, down 11.8% on a reported basis of which 6.7% was underlying and 5.1% related to FX headwinds. Within the underlying profit changes, there was a £48.4m decline due to the drop-through from volume declines, partially offset by a positive contribution of £32.1m from net pricing, with the remainder due to the impact of the February 2023 cyber attack (£3.5m cost) and other non-recurring one-off items (£5.5m benefit), which largely arose in H2. Return on sales of 10.4% was down 40bps on an underlying basis. The reduction in trading profit and Return on Sales is primarily due to the drop-through impact of volume declines.

The pattern of trading in the year was relatively strong in H1, while trading in H2 was somewhat weaker, reflecting both seasonality and weaker market conditions, notably in Europe.

t of average 2023 exchange ed to 2022 averages has ind of £12.5m at a trading particular, due to the depreciation of the Turkish Lira, Indian Rupee, Chinese Renminbi and the Argentine Peso versus Sterling. Translated at FX rates as at 28 February 2024, FY23 revenue would be c. £1,875m and trading profit would be c. £191m.

Investment in R&D is central to our strategy of delivering market-leading product technology and services to customers. In 2023 we spent £37.4m on R&D activities (2022: £35.9m), which represents 1.9% of our revenue (2022: 1.8%).

Net Interest cost for FY23 was broadly flat year on year at £11.6m (2022: £11.4m), reflecting both an increase in net interest expense and interest income due to the higher interest rate environment and some small deposits held in high inflation-rate countries.

Profit from joint ventures and associates was broadly flat year on year at £0.9m (2022: £1.2m).

Headline profit before tax ('PBT') was £189.7m, down 12.6% versus last year on a reported basis. Including amortisation (£10.3m), PBT of £179.4m was 13.2% lower than last year.

Mark Collis
Chief Financial Officer

Basis of preparation

All references in this financial review are to headline performance unless stated otherwise. See Note 35.1 to the Group Financial Statements for the definition of headline performance.

We also report key metrics on an underlying basis, where we adjust to ensure appropriate comparability between periods, irrespective of currency fluctuations and any business acquisitions and disposals.

This is done by:

- Restating the previous period's results at the same foreign exchange (FX) rates used in the current period
- Removing the results of disposed businesses in both the current and prior years
- Removing the results of acquired businesses in both the current and prior years

Therefore, for 2023, we have:

- Retranslated 2022 results at the FX rates used in calculating the 2023 results
- No adjustments have been required for acquisitions or disposals

Financial review continued

Revenue

	2023			2022	% change	
£m	**Reported**	Reported	Currency	Underlying	Reported	Underlying
Steel	**1,400.0**	1,496.4	(42.0)	1,454.5	(6.4%)	(3.7%)
Foundry	**529.8**	551.0	(13.3)	537.7	(3.8%)	(1.5%)
Total Group	**1,929.8**	2,047.4	(55.3)	1,992.1	(5.7%)	(3.1%)

Trading profit

	2023			2022	% change	
£m	**Reported**	Reported	Currency	Underlying	Reported	Underlying
Steel	**147.6**	172.7	(9.6)	163.2	(14.6%)	(9.6%)
Foundry	**52.8**	54.5	(3.0)	51.5	(3.1%)	2.5%
Total Group	**200.4**	227.2	(12.5)	214.7	(11.8%)	(6.7%)

Return on sales

	2023			2022	% change	
£m	**Reported**	Reported	Currency	Underlying	Reported	Underlying
Steel	**10.5%**	11.5%		11.2%	(100bps)	(70bps)
Foundry	**10.0%**	9.9%		9.6%	+10bps	+40bps
Total Group	**10.4%**	11.1%		10.8%	(70bps)	(40bps)

A key measure of tax performance is the Headline Effective Tax Rate ('ETR'), which is calculated on the income tax associated with headline performance, divided by the headline profit before tax and before the Group's share of post-tax profit of joint ventures. The Group's headline ETR, based on the income tax costs associated with headline performance of £51.9m (2022: £57.2m), was 27.5% (2022: 26.5%).

The Group's total income tax costs for the period include a credit within separately reported items of £3.1m (2022: £39.1m) which primarily relates to deferred tax on intangible assets.

A tax charge reflected in the Group Statement of Comprehensive Income in the year amounted to £2.0m (2022: £8.2m charge) which primarily relates to tax on net actuarial gains and losses on pensions.

We expect the Group's effective tax rate on headline profit before tax and before the share of post-tax profits from joint ventures to be around 27.5%, dependent on profit mix, in 2024.

Non-controlling interests principally comprise the minority holdings in Indian subsidiaries for the Steel and Foundry businesses. This increased to £12.1m in 2023 (2022: £7.4m) reflecting the strong growth in profit in those subsidiaries.

Headline EPS from continuing operations at 46.7p was 11.9% lower on an underlying basis than 2022, reflecting both the lower profit and the higher level of non-controlling interests.

Dividend

The Board has recommended a final dividend of 16.2 pence per share to be paid, subject to shareholder approval, on 31 May 2024 to shareholders on the register at 19 April 2024. When added to the 2023 interim dividend of 6.8 pence per share paid on 15 September 2023, this represents a full-year dividend of 23.0 pence per share. The last date for receipt of elections from shareholders for the Vesuvius Dividend Reinvestment Plan will be 9 May 2024.

Cost-saving programme

We have initiated an efficiency programme to realise recurring savings of £30m per annum by 2026, of which c.£3m is expected to be delivered in 2024. We expect to achieve a run-rate of c.£10–15m savings by the end of 2024. The programme costs are expected to be c.£40m, estimated to be split £30m/£10m to capex and operating expense respectively, of which c.£6m of operating expense is expected to be incurred in 2024. Material restructuring costs will be excluded from underlying performance, allowing for a clear measure of our operating performance.

Cash flow and balance sheet

Our cash management performance was robust, achieving an 93% cash conversion (2022: 82%), thanks to a good operational performance and an inflow from trade working capital, partially offset by a continued investment in strategic capacity expansion. As a result, we have reduced our net debt position and maintained our leverage ratio of net debt to EBITDA at 0.9x at 31 December 2023.

We measure working capital both in terms of actual cash flow movements, and as a percentage of sales revenue. Trade working capital as a percentage of sales in 2023 improved to 23.4% (2022: 23.8%), measured on a 12-month moving average basis. In absolute terms on a constant currency basis trade working capital decreased by £20.9m in 2023 to £420.3m. The reduction was principally due to a fall in inventory days (from 89.9 to 88.9, 12m average, December 2022 to 2023), broadly flat debtor days (78.0 to 77.6, 12m average, December 2022 to 2023) and flat creditor days (64.9 days, 12m average). The 12-month rolling average measurement masks the phasing in the year, with working capital peaking in H1 and then falling progressively in Q3 and Q4 as a percentage of revenue. We intend to continue to reduce our working capital intensity in 2024.

Free cash flow from continuing operations was £128.2m in 2023 (2022: £123.1m).

Capital expenditure

Cash capital expenditure in 2023 was £92.6m (2022: £89.2m) (£125.3m including capitalised leases) of which £93.2m was in the Steel Division (2022: £85.2m) and £32.1m in the Foundry Division (2022: £18.7m). Capital expenditure on revenue-generating customer installation assets, primarily in Steel, was approximately £9m (2022: £8m) and we spent c. £30m in 2023 on growth capex, largely focused on expansion in Flow Control worldwide and, more specifically, in Asia for all three Business Units. Total cash capex in 2024 is expected to be c.£100m, of which growth capex is expected to be c.£30–35m. Capital expenditure will then revert to more normalised levels from 2025 onwards.

The Group had committed borrowing facilities of £685.8m as of 31 December 2023 (2022: £721.9m), of which £333.4m was undrawn (2022: £322.5m).

Net debt

Net debt on 31 December 2023 was £237.5m, a £17.5m decrease from £255.0m on 31 December 2022, due to significant free cash flow partially offset by a return to shareholders of £63.8m by way of dividends and share buyback, by right of use asset additions of £31.2m and by a foreign exchange adjustment of £11.3m.

At the end of 2023, the net debt to EBITDA ratio was 0.9x (2022: 0.9x) and EBITDA to interest was 31.5x (2022: 29.8x). These ratios are monitored regularly to ensure that the Group has sufficient financing available to run the business and fund future growth.

The Group's debt facilities have two financial covenants: the ratios of net debt to EBITDA (maximum 3.25x limit) and EBITDA to interest (minimum 4x limit). Certain adjustments are made to the net debt calculations for bank covenant purposes, the most significant of which is to exclude the impact of IFRS 16.

Return on invested capital (ROIC)

Our ROIC for 2023 was 8.9% (2022: 10.7%). Excluding goodwill on our balance sheet from the acquisition of Foseco in 2008, ROIC for 2023 would be 14.3%. ROIC is our key measure of return from the Group's invested capital, calculated as trading profit less amortisation of acquired intangibles plus share of post-tax profit of joint ventures and associates for the previous 12 months after tax, divided by the average (being the average of the opening and closing balance sheet) invested capital (defined as: total assets excluding cash plus non-interest-bearing liabilities), at the average foreign exchange rate for the year).

Pensions

The Group has a limited number of historical defined benefit plans located mainly in the UK, USA, Germany and Belgium. The main plans in the UK and USA are closed to further benefits accrual. All of the liabilities in the UK were insured following a buy-in agreement with Pension Insurance Corporation plc ('PIC') in 2021. This buy-in agreement secured an insurance asset from PIC that matches the remaining pension liabilities of the UK Plan, with the result that the Company no longer bears any investment, longevity, interest rate or inflation risks in respect of the UK Plan.

The Group's net pension liability at 31 December 2023 was £46.3m (2022: £56.1m liability).

Financial Risk Factors

The Group's approach to risk management, including the mitigations in place for our principal risks, is detailed on pages 77 and 78. We consider the main financial risk faced by the Group to be a material business interruption incident leading to reduced revenue and profit. We also manage broad financial risks such as cost inflation, bank financing and capital market activity and to a lesser extent foreign exchange and interest rate movements (see Note 24 to the Group Financial Statements). We mitigate liquidity risk by financing using both the bank and private placement debt markets and we mitigate refinancing risk by seeking to avoid a concentration of debt maturities in any one calendar year.

Mark Collis
Chief Financial Officer
28 February 2024

Progress on our Sustainability roadmap

Every day we focus on improving the sustainability of our operations and help our customers improve the safety, energy efficiency, yield and reliability of their processes

Non-Financial and Sustainability Information Statement

This Non-Financial and Sustainability Information Statement provides information on the Group's activities and policies in respect of:

Environmental matters Our planet	p39-55
Climate-related reporting TCFD	p36-55
The Company's employees Our people	p58-63
Social matters Our communities	p64-67
Respect for human rights Our communities	p64
Anti-corruption and anti-bribery matters Our communities	p65

This statement also details, where relevant, the due diligence processes implemented by the Company in pursuance of these policies.

Further information, disclosed in other sections of the Strategic Report is incorporated into this statement by reference including:

Information on the Group's principal risks Details of the Group's principal risks relating to these non-financial and sustainability matters are detailed in the Group's schedule of principal risks and uncertainties.	p77-78
Risk, viability and going concern	p72-78
Details of the Group's business model	p20-21
Details of the Group's non-financial KPIs	p35

Vesuvius' sustainability strategy brings together all our environmental, social and governance initiatives into one coordinated programme. The strategy is built on four pillars: our planet, our customers, our people and our communities.

Our Sustainability key priorities

We have set out four key sustainability strategic priorities. Targets for three of these are embedded into our management incentive arrange

Become a zero - accident com

The number one priority at Vesuvius is to provide our employees with a safe place to work. We were pleased to see continued progress with the reduction of our Lost Time Injury Frequency Rate (LTIFR) in 2023, recording a rate of 0.6 per million hours worked in 2023 which was significantly lower than 2022 (1.1).

However, there were two serious incidents involving not directly supervised contractors in 2023, and the LTIFR for not directly supervised contractors and visitors increased to 1.6 in 2023 (versus 1.0 in 2022). The safety of contractors working on Vesuvius' sites remains a key area of focus for the Group.

2

Reach net zero CO_2e emissions by 2050 (Scope 1 and Scope 2)

Between 2019 and 2023, our overall CO_2e emission intensity metric (CO_2e emissions per metric tonne of product packed for shipment, Scope 1 and Scope 2, market-based) reduced by 45.5%, vs a target of 20% by 2025. However, this number is skewed by the Group's reduction in th tion of dolime during 2023, f the temporary closure of otary kilns. If the kiln had ting normally throughout the o forma 2023 CO_2e emission intensity would have been 20.2% lower than in 2019.

We have made considerable progress in energy conservation, with our conservation plan now in its third cycle of improvement. During 2024, we will continue to focus on further improvements, including modernising and upgrading equipment to reduce our energy consumption, and replacing high CO_2e emission electricity (generated from coal) with greener electricity or other sources of energy.

3

Help our customers reduce their CO_2 emissions

We help our customers improve the performance of their casting operations, thereby increasing the energy efficiency of their entire process.

In 2023, 83% of ongoing new product development projects were dedicated to market-leading sustainable products.

4

Improve gender diversity at every level of the Company

Women now represent 20% of our Senior Leadership Group (2022: 20%) which is a level that we consider is still too low, but which represents a significant improvement as compared with the level of 15% in 2019.

Our ambition remains to reach 25% by the end of 2025, though we see this as a challenging target given the relatively low attractiveness of our industry to female entrants. To meet this challenge we are placing greater emphasis on developing an internal pipeline of female talent.

External reporting

We are signatories to the UN Global Compact and report annually on our sustainability activities, commitments and progress. We are very proud of our progress to date and of the recognition we have received from leading rating agencies.

Future reporting requirements

We are monitoring the introduction of ISSB standards in the UK and going forward our reporting will reflect changes in the regulatory landscape. We have also started work on ensuring we have systems in place to comply with the European Union's CSRD requirements, which will be applicable to Vesuvius plc in 2029 and applicable to a number of our European subsidiaries in 2026. In 2024, we intend to carry out a gap assessment between our 2023 sustainability disclosures and the CSRD requirements, and build adequate plans.

External reporting & recognition

We are signatories to the UN Global Compact and report annually on our sustainability activities, commitments and progress.

We are very proud of our progress to date, as exemplified by the external recognition of the following rating agencies:

MSCI AA

ecovadis 2023 GOLD

CDP A-

Vesuvius' Environmental Policy

We commit to:

- Minimise direct and indirect CO_2 and other greenhouse gas emissions, by reducing the energy intensity of our business and using cleaner energy sources
- Minimise the consumption of water and other resources
- Reduce waste at source and during production
- Increase the usage of recycled materials and promote the development of the circular economy
- Minimise any pollution or releases of substances which could adversely affect humans or the environment
- Avoid negative impacts on biodiversity

See the full policy on www.vesuvius.com for further details.

2023 Reporting parameters

During 2023, our production of dolime was considerably reduced, following an incident which incapacitated one of our rotary kilns in January. As dolime production is the largest contributor to the Group's CO_2 emissions, the change in product mix skews environmental performance comparisons with prior years and with the 2025 target. In this report, we have therefore reported some pro forma numbers (as if the dolime process had been operating normally) to preserve meaningful comparability.

Our sustainability strategy and objectives

Creating a better tomorrow for our planet, our customers, our people and our communities

We create innovative solutions that help our customers improve their safety and quality performance, reduce their environmental footprint, become more efficient in their processes, and reduce costs. We work in close partnership with the most advanced steel-makers to develop the refractory products for the green steel-making and casting processes of the future.

We aim to deliver sustainable, profitable growth to provide our shareholders with a superior return on their investment, whilst providing our employees with a safe workplace where they are recognised, developed and properly rewarded.

Our Sustainability initiative sets out the Group's formal objectives and targets for supporting our customers, our employees and our communities, and for protecting our planet for future generations. It is embedded in the Group's overall strategy and informs how we deliver on our strategic priorities.

The Board has identified nine significant non-financial KPIs for the business, covering the Group's main Sustainability objectives. These KPIs were defined when the sustainability strategy was launched in 2020. Most targets associated with the KPIs have a deadline in 2025. Focus on these KPIs has been maintaine[illegible] following years. In 2024, we wi[illegible] on selecting the 2030 targets and KPIs.

Our planet

- To tackle climate change by reducing our CO_2e emissions and helping our customers reduce theirs with our products and services. We are committed to reaching a net zero carbon footprint at the latest by 2050
- To engage in the circular economy by reducing our waste, recovering more of our products after they have been used and increasing the usage of recycled materials

p39

Our customers

- To support our customers' efforts to improve safety on the shop floor, especially exposure to hot metal
- To help customers improve their operational performance and thereby reduce their environmental footprint, and especially their CO_2 emissions

p56

Our people

- To ensure the safety of our people and everyone else who accesses our sites. This is our first priority. We take safety very seriously and are constantly striving to improve
- To offer growth opportunities to all our employees through training and career progression to develop

p58

Our communities

- To support the communities in which we operate, with a focus on promoting and supporting women's education in scientific fields
- To ensure ethical business conduct both internally and with our trading partners
- To extend our sustainability commitment to our suppliers and encourage them to progress

p64

Progress on our Sustainability targets

The Group's non-financial KPIs cover the Group's main Sustainability objectives. We have set stretching targets for the Group's sustainability KPIs to reach within set time frames. These are set out in the table below.

Strategic Value alignment	KPI	Measure	Target	2023 progress vs plan[1]	2023 progress	Link to remuneration
Safety p21	Safety	Lost Time Injury Frequency Rate	<1		0.60	**Vesuvius Share Plan** – Read more about this on p123–128
Sustainability p21	Energy intensity	By 2025, reduce energy intensity per metric tonne of product packed for shipment (vs 2019)	-10%		-7.2%[1,2,3]	
	CO_2e	By 2025, reduce Scope 1 and Scope 2 CO_2e emission tonne of shipment	-20%		-20.2%[1,2,3]	**Annual Incentive Plan and Vesuvius Share Plan** – Read more about these on p123–128
		astewater product packed for shipment (vs 2019)	-25%		-11.6%[1,2,3]	
	Solid waste	By 2025, reduce solid waste (hazardous and sent to landfill) per metric tonne of product packed for shipment (vs 2019)	-25%		-19.7%[1,2,3]	
	Recycled material	By 2025, increase the proportion of recycled materials from external sources used in production	7%		5.7%[1,2,3]	
Rewarding careers p21	Gender diversity	By 2025, increase female representation in the Senior Leadership Group (approx. 150 top managers)	25%		20%	**Annual Incentive Plan and Vesuvius Share Plan** – Read more about these on p123–128
	Compliance training	Increase the percentage of targeted staff who complete anti-bribery and corruption training annually	90%		100%	
Quality p21	Supply chain	By the end of 2023, conduct sustainability assessments of our raw materials suppliers (as a percentage of Group raw material spend)	50%		52%	

Progress key

Behind plan · On plan · Ahead of schedule · Target achieved

During 2023, our production of dolime was considerably reduced, following an incident in January which incapacitated one of our rotary kilns. As dolime production is a major contributor to the Group's tonnage and CO_2 emissions, the change in product mix skews environmental performance comparisons both with prior years and with the 2025 target. The table below therefore contains pro forma performance figures as if the dolime process had been operating normally to preserve meaningful comparability. The actual figures are set out in a footnote to the table.

1. Re-baselined using pre-acquisition data for the business acquired from Universal Refractories, Inc. (Vesuvius Penn Corporation), and BMC (Yingkou YingWei Magnesium Co., Ltd).
2. Pro forma: performance as if the dolime process had been operating normally in 2023.
3. Actual Group performance for 2023, with actual dolime production: Energy intensity -14.6%, CO_2e emission intensity -45.5%, Wastewater -4.0%, Solid waste -13.4%, Recycled material 6.5%.

Details of the Group's **Financial KPIs** can be found on page 28.

Task Force on Climate-related Financial Disclosures

The disclosures included in this Annual Report are consistent with the Task Force on Climate-related Financial Disclosures (TCFD) Recommendations and Recommended Disclosures, and have been prepared taking into account the Guidance for all sectors. The disclosure is also in accordance with FCA Listing Rule requirements.

This section provides the relevant disclosures or otherwise provides cross-references, in the table below, for where the disclosures are located elsewhere in the Annual Report.

In preparing this TCFD disclosure we considered recent developments in global affairs and macro trends, such as:

- The acceleration of the growth of the electric vehicle market (and consequently the faster peak and decline of the hybrid vehicle market)
- The energy crisis and price gaps that appeared between regions, and at the same time, the rapid reduction of the cost per installed kWh of renewable energy and associated massive investments plans
- The development and implementation of policies in all regions aimed at accelerating the transition to renewable sources of energy and the decarbonisation of industry

We concluded that the underlying assumptions and drivers of our scenario analysis, and the risks and opportunities that we have identified, do not require any significant modification this year.

We are aware of a growing acceptance that the 1.5°C global warming ambition will not be met, which supports the assumption in our scenario plans that the most optimistic scenario is a 2°C increase in global warming.

Topic		Disclosure summary	Vesuvius disclosure	
Governance	Disclose the organisation's governance around climate-related risks and opportunities.	**a** Describe the Board's oversight of climate-related risks and opportunities.	*Sustainability: TCFD* *Risk, viability and going concern* *Directors' Remuneration Report*	p37 p72-78 p108-135
		b Describe management's role in assessing and managing climate-related risks and opportunities.	*Sustainability: TCFD* *Risk, viability and going concern*	p37-40 p72-78
Strategy	Disclose the actual and potential impacts of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning where such information is material.	**a** Describe the climate-related risks and opportunities the organisation has identified over the short, medium and long term.	*Sustainability: Our planet*	p39-43
		b Describe the impact of climate-related risks and opportunities on the organisation's businesses, strategy and financial planning.	*Sustainability: Our planet* *Our external environment* *Sustainability: Our customers*	p39-53 p10-13 p56-57
		c Describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	*Sustainability: Our planet*	p44-46
Risk management	Disclose how the organisation identifies, assesses and manages climate-related risks.	**a** Describe the organisation's processes for identifying and assessing climate-related risks.	*Sustainability: Our planet* *Risk, viability and going concern*	p39-43 p72-78
		b Describe the organisation's processes for managing climate-related risks.	*Sustainability: Our planet* *Risk, viability and going concern*	p39-43 p74
		c Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organisation's overall risk management.	*Sustainability: Our planet* *Risk, viability and going concern*	p39-43 p72-78
Metrics and targets	Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.	**a** Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process.	*Sustainability*	p35 and 41
		b Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 GHG emissions, and the related risks.	*Sustainability: Our planet*	p50-53
		c Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets.	*Sustainability: Our planet*	p35 and p50-55

Sustainability governance structure

In 2023, the governance structure for the oversight of sustainability and climate change matters, and their associated areas of focus remained the same as in previous years.

Board oversight

The Board holds overall accountability and oversight for all matters related to sustainability and the management of all risks and opportunities, including the impact of climate change on the Group. In setting the Group's strategy it ensures that sustainability is embedded at the heart of the Group and is reflected in the operational plans of each Business Unit. The Board formally reviews all significant sustainability programmes.

The Board's oversight of the Group's response to climate change is integrated into both its monitoring of the Group's broader sustainability strategy and initiatives, and its approach to significant capital and other investments. The Board formally discusses the Group's Sustainability initiative at least twice per year.

It sets the Group's priorities and targets, and reviews the Group's performance and progress against them. It also monitors the Group's external ESG ratings.

The Board has undertaken a detailed assessment of the Group's climate-related risks and opportunities, including the Group's physical and transition risks. It has also considered the formulation of the three different climate-related scenarios constructed to assess the potential financial implications of climate change and assessed the impact of climate-related risks and opportunities on the Group's strategy.

The Group's Audit Committee supports the Board in ensuring climate-related issues are integrated into the Group's risk management process, and reviewing the Group's TCFD reporting and the assessment of performance against targets. As the Executive Director with key responsibility for the delivery of the Group's strategy, our Chief Executive, Patrick André, is ultimately responsible for the Sustainability initiative.

Our Sustainability governance

Chief Executive
Is ultimately responsible for the delivery of the Sustainability initiative

Board

- Holds accountability and oversight for all matters related to sustainability
- Oversees the definition of the sustainability strategy and initiatives
- Sets the main targets, reviews performance and progress

Audit Committee

- Supports the Board in ensuring climate-related issues are integrated into the Group's risk management process
- Reviews the Group's TCFD reporting and assessment of performance against targets

Remuneration Committee

- Supports the Sustainability objectives through the alignment of the Group's remuneration strategy

Group Executive Committee

Chief Executive, Chief Financial Officer, General Counsel and Company Secretary, Chief HR Officer, Business Unit Presidents

- Approves Group sustainability-related policies
- Receives reports from the VP Sustainability on the Sustainability initiative
- Is responsible for the progress of the Group against its sustainability objectives

BU Presidents

- Incorporate Group sustainability strategy into their BU strategy
- Communicate targets inside their organisations
- Allocate resources, define and implement plans

Sustainability Council

Group Executive Committee, Vice President Sustainability, Head of Communication and Employee Engagement, Head of Investor Relations, Head of Strategy, Vice Presidents Operations, three Regional Business Unit VPs

- Oversees the Group's sustainability activity
- Monitors progress on metrics and targets
- Assists the Group in assessing the implications of long-term climate-related risks and opportunities, elaborating strategy and setting priorities

VP Sustainability

- Leads the Group's sustainability activities, coordinating the work of the Sustainability Council
- Ensures the Group has a clear set of KPIs and collates data
- Organises Group-wide communication
- Leads external reporting and disclosures

Task Force on Climate-related Financial Disclosures continued

The Remuneration Committee supports the Group's Sustainability initiative and climate-change-related objectives, through the alignment of the Group's remuneration strategy. All Business Unit Presidents and each of the regional Business Unit Vice Presidents have a part of their annual incentive compensation tied to performance targets on CO_2e emissions reduction. In addition, the Executive Directors and other members of the Group Executive Committee participate in the Group's Long-Term Incenti
of eac
measures, focused on:

- Reduction of the Lost Time Injury Frequency Rate;
- Reduction of the Group's Scope 1 and 2 CO_2e emissions; and
- Improvement in the gender representation in the Senior Leadership Group.

Management assessment and oversight

The Vesuvius Sustainability Council is chaired by the Chief Executive, and comprises the Group Executive Committee, VP Sustainability, regional Vice Presidents from each Business Unit, Head of Strategy, Head of Communication and Employee Engagement, Head of Investor Relations and Vice Presidents of the Operations.

It meets on a quarterly basis and oversees the Group's sustainability activities, especially related to climate change, monitors progress against our targets, and assists the Board with identifying and assessing the implications of long-term climate-related risks and opportunities, elaborating sustainability strategy, and setting priorities. The Council reports to the Board twice per year.

The VP Sustainability leads the Group's sustainability activitie

risks and opportunitie
of climate-related sce
responsible for the collation of data to assess the Group's performance against its sustainability targets and KPIs, producing quarterly performance reports, managing Group-wide communications, and leading external reporting and disclosures.

Responsibility for the progress of the Group against its sustainability objectives lies with the Group Executive Committee and, operationally, each Business Unit President. These BU Presidents, along with the Regional BU VPs, ensure the Group sustainability strategy is reflected in each BU's strategy, communicating the sustainability targets inside their organisations and implementing plans – including overseeing resources and capital allocation, and selecting R&D priorities – to achieve these targets and address the climate-related risks and opportunities.

The VP Sustainability is responsible for overseeing reporting on the Group's sustainability matters and metrics. Formal channels for reporting a range of data points are embedded in the organisation. Escalation mechanisms, routine reviews, and internal controls such as auditing and due diligence are in place to ensure transparency, consistency and completeness of information. For certain topics these are supported by independent third-party verification.

Our Sustainability Council and VP Sustainability ensure that we have a clear set of KPIs and targets to track the Group's progress.

Scope 1, 2 and 3 CO_2 and CO_2e emissions

Scope 1 covers emissions from fuels used in our factories and offices, fugitive emissions and non-fuel process emissions.

Scope 2 relates to the indirect emissions resulting from the generation of electricity, heat, steam and hot water we purchase to supply our offices and factories.

Scope 3 includes all other indirect emissions that occur in the Company's value chain.

Vesuvius materiality assessment

Our Sustainability initiative focuses on our most significant sustainability issues and opportunities. These are defined by our ongoing materiality assessment, which identifies and prioritises issues based on two dimensions: the impact or likely impact of Vesuvius on society and the environment, and the impact on Vesuvius' business, creating financial risks and opportunities for Vesuvius.

Our planet

Vesuvius recognises the urgency of tackling climate change, the finite nature of most natural resources, and the obligation we have to preserve the environment for future generations. By their very nature, refractory products help our customers to reduce heat loss and the energy consumption of their processes. We are committed to making a strong contribution to the reduction of their greenhouse gas emissions. We also want to grow our engagement in the circular economy by extending the lifetime of our products, recovering and recycling more of our products after they have been used, and increasing the proportion of recycled materials in our recipes. Environmental compliance at our sites, reduction in waste and increased recycling are key to Vesuvius' operations and can be a significant differentiator for our business

Tackling climate change

We are committed to reducing our environmental footprint by reach
The secret object #1 is a
gas emissions by 2050 at the latest and helping our customers reduce improvements in the efficiency of their operations.

Supporting policy development

Vesuvius supports the Paris Agreement's central aim, to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2°C above pre-industrial levels, and pursuing efforts to limit the temperature increase even further to 1.5°C, via the implementation of its Roadmap to Net Zero.

As the world transitions to a low-carbon global economy, Vesuvius supports the call for policymakers to:

- Build a level global playing field, including carbon border adjustment mechanisms, and robust and predictable carbon pricing for companies. This will strengthen incentives to invest in sustainable technologies and to change behaviours
- Develop the necessary energy production and distribution infrastructure to provide access to abundant and affordable clean energy

Reducing our impact

Vesuvius actively participates in measures to tackle climate change by working to reduce the CO_2e emissions of all of our operations and the quantity of raw materials used, alongside helping our customers to reduce their own CO_2 footprint through the use of our products and services. Vesuvius also embraces society's expectations for greater transparency around environmental reporting.

Supporting our customers

According to estimates from the World Steel Association (WSA), the steel industry generates between 7% and 9% of global direct emissions from the use of fossil fuels, and it estimates that on average, 1.91 metric tonnes of CO_2 are emitted for every tonne of steel produced.

The iron and steel industries are taking action to address the decarbonisation challenge, and we are supporting them, working in partnership with them to develop more sustainable solutions.

With around 10kg of refractory material required per tonne of steel produced, the careful selection and use of energy-saving refractories can beneficially impact the net emission of CO_2 in the steel manufacturing process. In the foundry process, the amount of metal melted versus the amount sold as finished castings is the critical factor impacting a foundry's environmental efficiency. Vesuvius continuously works with its customers to increase this metal yield.

Climate-change-related risks and opportunities

The actions being taken by governments and societies around the world to mitigate climate change, and the changes in temperature and weather patterns resulting from it, present both opportunities and risks to Vesuvius. In its broadest context, we believe that the need for climate change initiatives will create ever greater opportunities for the Group to support our customers – to improve their efficiency and reduce their environmental impact.

Methodology

Each year the Group undertakes a robust assessment of the principal and emerging risks which could have a material impact on the Group; this assessment covers all of Vesuvius' operations. A number of sustainability risks are recorded in this analysis (see the Risk, viability and going concern section on pages 72-78 of our Annual Report).

In line with the recommendations of TCFD, Vesuvius also undertakes a review of the key climate-related opportunities and risks that we foresee impacting the Group over the short, medium and long term.

The Board has considered the significance of climate-related risks in relation to risks identified in the standard risk management process. Climate-related risks are reviewed every six months by the GEC, and subsequently by the Board, as part of the Group's standard risk management process, to ensure the register reflects any material changes in the operating environment and business strategy, and to ensure that the management of climate-related risks is integrated into our overall principal risk management framework.

The Business Units factor climate-change risks and opportunities into their business planning processes, assessing the long-term impacts on profitability of both the risks and opportunities.

Tackling climate change continued

Physical risks and business continuity

Thanks to significant restructuring carried out over the past six years, Vesuvius now operates in a resilient and optimised global footprint. None of our manufacturing sites contribute directly or indirectly to more than 10% of our revenue and a significant amount of redundancy for most product lines remains, providing backup in case of local disruption and ensuring continuity of supply for our customers.

Vesuvius operates in 55 manufacturing sites and six R&D centres of excellence located in 26 countries. From time to time our operations can be subject to physical damage driven by weather events, such as severe storms and flooding, water shortages or wildfires, whose frequency and intensity may be exacerbated by climate change. Such events may also impact the manufacturing capabilities of our customers and suppliers, and impact our supply chain logistics.

Sites are routinely audited by our insurers and our external risk specialist. Their reports are combined with water stress analyses (based on the Aqueduct water risk atlas) and our history of events, to create a physical and weather event risks map, indicating our manufacturing and R&D sites' susceptibility to physical risks arising from climate change.

In 2023, we continued updating our risk map based on professional risk engineering surveys. Thirty sites were identified as being high risk for at least one type of weather event (flooding, hailstorm, lightning, storms, tornadoes and wildfires), and four are located in areas of very high water stress. None of our sites were materially affected by any major weather event in 2023 (no disruption to customers and no insurance claims made).

We anticipate that the occurrence of adverse weather events will continue to increase, and we therefore manage our business to prepare for them and mitigate their impact when they do occur.

Local and product line business continuity plans are maintained by our manufacturing sites and are regularly reviewed. Vesuvius sites maintain and exercise emergency plans to deal with such events as part of their normal risk management and business continuity processes. Exercises and drills are organised covering IT disaster recovery, fire, explosion, weather and geophysical events, and our processes are improved based on the lessons learned.

The assessment of physical risks and business continuity has been focused primarily on our footprint. In coming years, we will seek to extend this assessment to our customer and supplier base.

Sites with the highest exposure to water stress or weather events

Country	Site	Water stress (very high)	Flood – water bodies	Flood – precipitation	Hailstorm	Lightning	Wind – tropical storms	Wind – extra tropical storms	Tornado	Wildfire
Australia	Port Kembla					●				●
Belgium	Ostend							●		
Brazil	Piedade				●	●				
	Resende		●	●		●				
	São Paulo				●	●				
China	Anshan	●								
	Changshu		●							
	Wuhan				●					
	Yingkou BMC			●						
	Yingkou BRC			●						
Czech	Trinec		●							
India	Kolkata		●	●			●			
	Mehsana	●								
	Puducherry	●								
	Pune	●								
	Visag (VP, VS)						●			
Indonesia	Jakarta Timur		●			●	●			
Italy	Muggio				●					
Japan	Toyokawa						●	●		
Malaysia	Pelubhan Klang		●	●		●	●			
Mexico	Monterrey		●							
	Ramos Arzipe		●							
Netherlands	Hengelo		●							
Poland	Skawina		●							
South Africa	Johannesburg		●		●	●				
Taiwan	Ping Tung					●	●			
UK	Tamworth		●							
USA	Champaign					●			●	
	Charleston								●	
	Chicago Heights					●			●	
	Conneaut		●			●			●	
	Coraopolis		●			●				
	Wampum		●			●				
	Wurtland					●				

Highest exposure to weather events based on risk evaluations by insurance and Aqueduct water risk atlas.

Climate-related risks and opportunities analysis

The fight against climate change continues to require higher-technology steel and larger, more complex castings. Wind and solar energy production capacity are both considerably more steel-intensive than fossil fuel power stations, and these are both set to grow considerably. Allied to this, the steel-making process is itself decarbonising thanks to efforts to improve the performance of existing assets, and the shift from blast furnaces to electric arc furnaces.

Our products are useful for low-carbon applications as well as the more traditional ones. No alternative to iron and steel, with the ability to offer the same range of properties and applications at comparable scales and costs, is envisaged in the foreseeable future. The technology transition required to decarbonise the iron and steel industry will not render our products obsolete. More than 70% of our revenue in steel is generated at the ladle and caster stages of the steelmaking process, which will be unaffected by the changes. Other steps of the iron and steel-making process will continue to require refractory materials.

Transition risks

We believe that the main climate change transition risks facing the Group relate to:

1

The potential for carbon taxing or emissions rights trading schemes to be introduced or increased, in Europe and the US, but not uniformly in other regions, without effective border adjustment mechanisms to accompany them; and

2

The rapid transition from iron to aluminium for light vehicle castings.

An increase in the cost of carbon emissions would affect our manufacturing costs. We are addressing this through our energy efficiency improvement initiatives and conversion to non-fossil fuels wherever possible. Long-lasting energy price increases and significant differences between Europe and other regions would further exacerbate this risk, affecting our customers' manufacturing footprint and our own.

A very rapid transition from iron to aluminium for light vehicle castings would affect our revenue in the iron castings market. We expect this to be compensated for by increased sales for aluminium castings, growing sales of products for thin-section automotive component iron castings and turbo-charger castings for hybrid vehicles.

Climate-change-related metrics

We routinely monitor a large number of metrics, both internal and external, to assess the ongoing validity of our assumptions and identified risks and opportunities, and monitor the progress of actions. Some of the main metrics are listed in the table below:

External metrics	
– projected CAGR of the high-technology steel segment	+2.7% between 2022 and 2032 (vs 0.5% for commodity steel)
– projected CAGR of the wind turbine market	13% (between 2023 and 2030)
– projected CAGR of the electric vehicle market	24% (between 2020 and 2030)
– projected CAGR of the hybrid vehicle market	14% (between 2020 and 2030)
– projected CAGR of the internal combustion engine vehicle market	-4% (between 2020 and 2030)
– projected CAGR of the EAF market	3.6% (between 2022 and 2028)
Internal metrics	
– Steel sales into the EAF market	29% in 2023
– percentage of Flow Control sales from high-technology steel	58% in 2023
– percentage of Foundry sales into non-ferrous markets	19% in 2023
– percentage of sales realised with products which didn't exist five years ago	18% in 2023
– energy intensity (kWh per kg product packed for shipment)	7.2% reduction in 2023 vs 2019 baseline
– R&D spend	+8% p.a. from 2020 to 2023
– number of sites at high risk of water stress or at least one type of weather event	34 in 2023
– number of sites with negative or poor risk ratings from the insurance loss prevention risk evaluation	8 in 2023

Tackling climate change continued

Climate-related risks and opportunities analysis

Vesuvius considers the key climate-related opportunities and risks that we foresee impacting the Group over the following short-, medium- and long-term time horizons.

Short term (2025)

Our current strategic plans operate within this time frame. Most of the intermediate sustainability targets approved by the Board were set with [illegible]. This horizon encom[illegible] expenditure cycle, allowing time to decide, implement and measure the progress of actions.

Medium term (2035)

This is the most likely horizon for the regulatory frameworks (such as the EU Emissions Trading System and Carbon Border Adjustment Mechanism) currently being defined in many regions to reach their full effect. We anticipate that the major adjustments to customers' footprints and technology investments will be in full swing by then.

Long term (2050)

This deadline has been retained by the UN and many policy-making bodies to set decarbonisation goals. We are committed to reaching net zero by 2050 at the latest.

The opportunities we have identified are integrated into the Group's business strategy and are being pursued by the relevant Business Units. See page 1-23 in our Strategic Report.

Major (£[illegible])	Minor (£1–5m)
High (£10–15m)	Insignificant (£0–1m)
	Moderate (£5–10m)

Opportunities

Opportunity	Description	Impact	Potential annual impact on trading profit in the short, medium and long term		
			Short term 2025	Medium term 2035	Long term 2050
Products and services					
Ability to diversify business activities	Commercialise refractory solutions for low-CO_2 emitting processes in the production of aluminium to replace carbon-based products	Increased revenue and trading profit	Minor	Minor to moderate	Minor to major
	Commercialise refractory solutions for hydrogen-based Direct Reduction Iron production and steel to replace traditional refractory products		Insignificant	Insignificant to minor	Insignificant to high
Markets					
Access to new markets	Accelerated growth of the wind turbine market leading to increased sales to foundries serving this market	Increased revenue and trading profit	Minor	Minor	Minor to high
	Accelerated growth of the aluminium castings market for electric vehicles and light-weighting leading to increased sales to foundries serving this market		Minor	Minor	Moderate to high
	Accelerated growth of ferrous castings for hybrid vehicles (turbo-chargers) and thin-section castings for internal combustion engines leading to increased sales to foundries serving this market		Insignificant to minor	Insignificant to minor	Insignificant
	Accelerated growth of the high-technology steel segment		Minor	Minor to high	High to very high

Impact categories (trading profit)

We have assessed our risks and sorted them according to the following classification, which used the same thresholds as for the assessment of principal risks:

Very high (>£25m)		Moderate (£5–10m)	
Major (£15–25m)		Minor (£1–5m)	
High (£10–15m)		Insignificant (£0–1m)	

Risks

Risks	Description	Impact	Mitigating actions being undertaken	Potential annual impact on trading profit in the short, medium and long term		
				Short term 2025	Medium term 2035	Long term 2050
Physical risks						
Increased frequency and severity of extreme weather events (heatwaves, rain and river flooding, cyclones, snow)	Physical damage to Vesuvius locations and people Business disruption due to natural disasters	Increased cost due to physical damage Reduced revenue from business interruption	Mitigating actions for severe weather events and the associated risks are included in the business continuity plans of plants, and insurance is purchased	Minor	Minor	Minor
Transition risks – Policy and legal						
Carbon taxing/ emissions rights trading/border adjustment mechanisms introduced or extended	Increase in manufacturing costs	Increased operating costs (main risk in Europe)	Capex to improve energy efficiency and conversion to non-fossil fuels to eliminate CO_2 emissions. Relocation of manufacturing to reflect movements in customer base	Minor	Insignificant to moderate	Insignificant to high
Transition risks – Market						
Rapid growth of aluminium casting processes for light vehicle castings at the expense of traditional ferrous and other non-f… proce… to conversion to electric vehicles)	Shift from castings using a high level of consumables to low consumable processes creates risk… Division	Reduced revenue from shrinking market as some traditional castings will …	In ferrous, push to develop sales of Feedex and coatings for thin-section automotive components, and products for turbo-charger casting. Invest in R&D, marketing and sales force. In non-ferrous, develop products for HPDC and LPDC processes and increase penetration in markets with lower usage of refractories	Minor	Moderate to high	Moderate to major
Transition from internal combustion engines to electric vehicles will lead to the decline of sand and gravity castings	Reduced volume of aluminium power train components	Reduced revenue from shrinking market of consumables for sand and gravity castings	Adapt product portfolio, focusing on HPDC and LPDC	Minor	Minor to moderate	Moderate
Transition from Blast Furnaces – Basic Oxygen Furnaces converted to Direct Reduction Iron or Electric Arc Furnaces (EAF) for iron and steel making	Share of EAF in total steel production increases	Reduced size of market where Vesuvius is strongest, leading to weaker positions in the steel market	Adjust R&D and product development priorities. Redeploy sales force, focusing on EAF market	Insignificant	Minor to moderate	Minor to moderate

Tackling climate change continued

Climate change scenario analysis

Vesuvius has undertaken scenario analysis to seek to quantify the likely impact of climate change on the business and to test the resilience of the Group's strategy to the changes that lie ahead.

We considered three scenarios, modelling the potential financial impact of 2°C, 3°C and 4°C temperature increases on our business.

Best case scenario

In formulating our scenarios, we took as our 'best case' a 2°C scenario. This was based on the premise that despite the tremendous acceleration of public awareness, regulation, technology development and capital allocation in recent years, we doubt that there is sufficient time for the 1.5°C target to be achieved. We therefore identified our most optimistic scenario as 2°C.

Our assumption is that any further acceleration which would allow the planet to get back onto a 1.5°C course would reinforce the main characteristics and accelerate the timeline of our 2°C scenario, without fundamentally changing its features.

From assumptions to strategy

The scenarios take as their starting point the regulatory and macroeconomic assumptions underpinned by the International Energy Agency's WEO 2020 Stated Policies Scenario and Sustainable Development Scenario.

Supplementing this we have identified, for each scenario, the areas of our business in which changes may occur, such as:

- The evolution of end-markets;
- Our customer footprint;
- The pace and breadth of technology transition in iron and steel making;
- The pace of conversion from fossil fuels to clean electricity and hydrogen; and
- The evolution of the aluminium market.

We then evaluated the potential magnitude of the risks and opportunities in each scenario, and analysed the implications for Vesuvius. We considered our strategic response in terms of:

- Our manufacturing and commercial footprint;
- Our portfolio of products and services;
- The conversion of our manufacturing processes to clean energy; and
- The prospects for our aluminium casting business.

With this approach, the impacts on all key areas of the business were covered (sales, R&D, manufacturing and procurement).

The outcomes of the scenario analyses have been taken into account in formulating plans for achieving the Group's strategy.

Three long-term scenarios

4°C warming scenario
'Good intentions hampered by fear of economic war'

Incomplete policy and fiscal packages distort competition, slowing down technology development and leading to geographic shifts in steel supply

3°C warming scenario
'Closed doors'

Regional/national self-interest drives economic policy, competition wins over cooperation, regulatory framework and technologies evolve differently

2°C warming scenario
'Global accord'

High cooperation and commitment to limit emissions facilitates technology development and the transition to a low-carbon world

	4°C warming scenario – 'Good intentions hampered by fear of economic war'	3°C warming scenario – 'Closed doors'	2°C warming scenario – 'Global accord'
1 **Regulatory and macroeconomic environment**	The European Union and United States implement carbon pricing mechanisms (taxation or cap on trade), but no Carbon Border Adjustment Mechanism or Tariffs (or insufficient to prevent the transfer of manufacturing away from these regions)	The European Union and United States implement carbon pricing mechanisms (taxation or cap on trade), and Carbon Border Adjustment Mechanisms or Tariffs to protect their industries from delocalisation	All major economies implement carbon pricing mechanisms. The cost of CO_2 increases in all regions at a comparable pace
2 **Conversion of power generation from fossil fuels to clean electricity and hydrogen**	– Fast growth of non-CO_2 emitting electricity sources (nuclear and renewable) in Europe – The cost of fossil fuels increases significantly in Europe – Energy prices differ greatly between Europe and the rest of the world over a long period of time – Coal reduces progressively, but does not disappear. Natural gas continues to grow outside Europe – Hydrogen does not become available on a wide scale and economically competitive until well after 2040	– Fast growth of non-CO_2 emitting energy sources (nuclear and renewable) in Europe – The cost of fossil fuels increases significantly in Europe. Coal reduces progressively, but does not disappear, natural gas continues to grow outside Europe – Energy prices in Europe and the rest of the world realign progressively – Hydrogen becomes available on a wide scale in the USA and Europe and economically competitive between 2030 and 2040	– Fast growth of non-CO_2 emitting energy sources (nuclear and renewable) in all regions – The cost of fossil fuels increases significantly (taxation), coal as a source of energy disappears, natural gas starts to reduce – Energy prices in Europe and the rest of the world realign progressively – Hydrogen becomes available on a wide scale and economically competitive between 2030 and 2040 – Fast electrification of the automotive industry – Fast growth of hydrogen-fuelled heavy vehicles
3 **Technology transition – iron and steel-making**	– The transition in blast furnaces to clean processes (e.g. Direct Reduction Iron (DRI), hydrogen, Carbon Capture and Storage (CCS), Carbon Capture, Utilisation and Storage (CCUS)) does not happen on a large scale – US steel producers convert blast furnaces to DRI and Electric Arc Furnaces (EAF) to benefit from the low cost and high availability of natural gas	– European iron-making transitions to clean processes (e.g. hydrogen, DRI, CCS, CCUS). The speed of the transition is dictated by the availability of green hydrogen in large quantities – Some US blast furnaces are converted to hydrogen, others to DRI & EAF – Chinese steel plants convert to clean iron and steel-making processes, albeit at a slower pace – Little or no transition outside China, the EU and USA	– Fast transition of iron making to clean processes in all regions; blast furnaces are revamped ahead of their normal schedule – European and Chinese integrated steel-making grows primarily in hydrogen-based iron production, implementing CCS and CCUS technologies as well – DRI and EAF grow in the US (benefiting from the availability of low-cost shale gas), and Europe – Customers also invest to increase the performance of furnaces, including downstream of casting
4 **High-technology steel market**	High-technology steel market grows at 0.9% per year	High-technology steel market grows at 1.2% per year (light-weighting and material efficiency efforts by downstream industries accelerate shift from lower to higher performance grades)	High-technology steel market grows at 1.6% per year (light-weighting and material efficiency efforts by downstream industries accelerate shift from lower to higher performance grades)
5 **Aluminium market**	Aluminium market grows at 3% per year, especially High Pressure Die Casting (HPDC) and Low Pressure Die Casting (LPDC) processes	Aluminium market grows at 5% per year (driven by the demand for transportation, construction and packaging) until 2030. Growth of HPDC/LPDC at a higher pace in the US and EU markets. Moderate development of secondary aluminium casting	Aluminium market grows at 7% per year (driven by the demand for transportation, construction and packaging) until 2025. Growth of HPDC/LPDC at a higher pace in the US and EU markets. Rapid development of secondary aluminium casting
Potential financial impact by 2035 (profit before tax)	**-£5m to £0m**	**£5m to £10m**	**£15m to £20m**

Tackling climate change continued

Key factors impacting Vesuvius' three climate change scenarios

1

Regulatory and macroeconomic drivers differentiate our scenarios

Firstly, effective border adjustment mechanisms to accompany carbon taxation, or cap and trade systems in regions with ambitious emissions reduction objectives, will greatly support the implementation of technologies required to decarbonise steel-making (including the development of hydrogen as the reducing agent). Conversely, the absence or ineffective implementation of border adjustments would lead to significant delocalisation of the steel industry and a displacement of CO_2 emissions to other countries rather than a significant reduction on a worldwide scale. The energy crisis which started in late 2021 and was particularly acute in Europe, has resulted in additional costs and loss of competitiveness for the European steel industry. In the short term, this was addressed by the temporary stoppage of steel plants. If the energy cost gap with other regions remains over several years, this could result in the permanent closure of steel plants and delocalisation of production to other regions. This shift in our customer footprint would lead to the need to adapt our own manufacturing footprint.

Secondly, public policy will significantly affect the relative cost and availability of non-CO_2 emitting energy sources vs fossil fuels and their associated infrastructures. These will greatly influence the pace of deployment of selected technologies and industries (electric veh carbon-free hydrogen and decarbonised steel-making). Infrastructure, construction and other downstream markets will also be incentivised to reduce steel consumption, accelerating the shift towards high-technology steel. Rising energy costs, as experienced since the end of 2021, will positively affect the growth rate of investment in renewable energies and penetration of electric vehicles in the automotive markets.

Finally, the level of international cooperation to encourage and support less developed economies to engage in the technology transition will also affect our customer manufacturing footprint. Regulatory and macroeconomic drivers may affect our climate change scenarios in the short, medium and long term.

2

The future of steel

All three scenarios assume that the strong connection between world GDP and world steel output will continue, supported by urbanisation and rising living standards, as there is no significant substitute for steel. The fight against climate change is expected to have a far-reaching impact on many different industries translating into the accelerated growth of the high-technology steel segment in which Vesuvius has a key presence. For example, solar and wind power plants, where investment is growing fast, are far more steel intensive per kWh of installed capacity than their fossil fuel equivalents. Likewise, hydrogen transportation, another area of rapid growth, also requires considerable amounts of special grades of steel for new pipelines and ships. With evolutions occurring over many years, this driver will have a stronger impact over the medium and long term than the short term.

3

Technology transition

Our scenarios consider the pace and extent of the technology transition in iron and steel-making. The Blast Furnace – Basic Oxygen Furnace (BF-BOF) route for steel making is significantly more CO_2 intensive than the Electric Arc Furnace (EAF) route. However, EAFs cannot always be us grad scrap

conti

Vario the BF-BOF route are being developed, including solutions which seek to capture the carbon as it is emitted and either store it or use the carbon in other processes. Alternatively the BF-BOF route may be replaced by a combination of DRI and EAF.

Hydrogen-based DRI associated with EAFs has the potential to be nearly carbon-free if carbon-free electricity and hydrogen are available. We anticipate that there will be a gradual reduction in steel production via the BF-BOF route and growth in the EAF route. The extent and pace of this change will depend on technologies coming to maturity, the availability of infrastructure (carbon-free electricity and hydrogen), and regulatory frameworks.

These technologies will require many years to mature and be deployed on a large scale. This driver is therefore expected not to have any impact over the short term, and to reach its maximum impact in the long term.

Conclusion on strategic resilience

Sustainability has always been at the heart of Vesuvius' business and the Group's analysis concludes that the opportunities for the Group manifested by the global pressure to mitigate climate change outweigh the risks. Our technology helps our customers improve their process efficiency and their environmental footprint.

We estimate the financial impact of the opportunities and risks on the Group will be most adverse under a 4°C scenario and most positive under a 2°C scenario. Under all three scenarios, we expect to benefit from the continuing growth in the production of steel in line with GDP, along with the accelerating shift towards higher performance iron and steel castings, as we support customers to maximise the efficiency and quality of their production. With our technological expertise, strong customer relationships and broad manufacturing footprint, we expect to play a key role in supporting our customers' efforts to decarbonise their operations.

We also believe there is a low downside for Vesuvius in all three scenarios as more than 70% of our business in steel is in the steel casting part of the operation which, as a stand-alone process, is low CO_2 emitting (1% to 3% of a steel plant's CO_2 emissions), and which we do not expect to be affected by technology shifts that the decarbonisation of iron and steel-making will require.

Whilst the electrification of light vehicles and ongoing light-weighting efforts are expected to translate into a shrinking of the market for certain iron castings, it is anticipated that this will be more than compensated for by the growth in other markets such as wind turbines and aluminium castings.

We do not anticipate that climate change will lead to any significant changes in our access to capital or require the impairment of assets on a material scale.

Roadmap to Net Zero

We have set intermediate targets in our journey to reach net zero CO_2e emissions by 2050 (Scope 1 and Scope 2), in line with the Paris Agreement and the UK's commitment in the Climate Change Act 2008 (2050 Target Amendment) Order 2019. These emissions encompass the seven GHGs listed by the Intergovernmental Panel on Climate Change in the Kyoto Protocol (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 and NF_3).

Our preferred metrics to monitor progress with our journey to net zero are energy and CO_2e emission intensity (energy consumption and CO_2e emissions per tonne of product packed for shipment). These reflect the progress made in our operations better than absolute metrics. Managing this energy intensity not only has environmental benefits, it is also part of our long-term strategy to enhance our cost competitiveness.

Our targets

Our targets cover 100% of Vesuvius' operations. They are aligned with the Science Based Targets initiative (SBTi) requirements for a well below 2°C global warming scenario and are consistent with the Paris Agreement.

- 10% improvement in the Group's energy intensity between 2019 and 2025
- 20% reduction in CO_2e emission intensity normalised per metric tonne of product packed for shipment (Scope 1 and Scope 2) by 2025 (vs 2019 baseline)
- 100% carbon-free electricity by 2030
- A reduction in total Scope 1 and Scope 2 CO_2e emission intensity of 50% by 2035 (vs 2019 baseline)
- Zero Scope 1 and Scope 2 emissions by 2050

We aim to achieve our decarbonisation goals without the use of any carbon offsets (or only to address residual emissions).

The Group Energy CO_2e emissions reduction targets have been cascaded to all Business Units, which have built action plans accordingly. Portions of the Group Executive Committee's Long-Term Incentive Plan and senior management annual variable compensation are linked to the achievement of CO_2e emissions reduction targets.

Our plan

Our roadmap to net zero is based on five key areas of focus:

1. Modernising and upgrading installed equipment to reduce our energy consumption
2. Investing to renew equipment to the best available technologies and converting to less CO_2e intensive energy sources
3. When possible, replacing high CO_2e emission electricity (generated from coal or natural gas) with greener electricity or other sources of energy
4. Reducing our energy wastage, recovering heat to feed processes and hot water
5. Generating clean energy

Assumptions and sensitivities

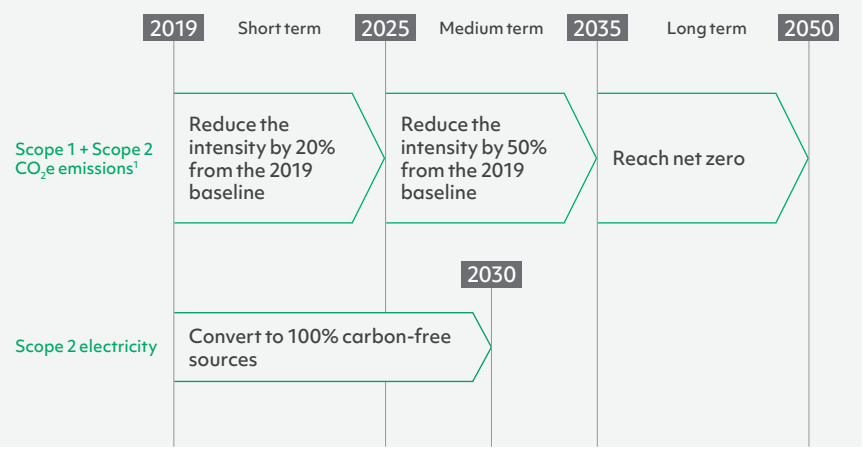
Some significant assumptions underpin our net zero plan, including:

- The availability of the necessary technologies, at an affordable level and at a scale appropriate for our industry, especially for the firing of refractory ceramics and carbon capture
- The development of additional production capacity and distribution infrastructure for renewable energy and hydrogen, and their cost competitiveness
- Adequate policy support to foster innovation and ensure the cost of CO_2 emissions will increase the attractiveness of carbon-free processes
- No significant change to our business model and product portfolio

The achievement of our CO_2e emissions targets will also be sensitive to:

- The growth of revenue, organically, and from acquisitions, and divestitures
- Product mix evolution (especially driven by dolime volume, which is the most CO_2 intensive product line)
- Macroeconomic conditions and the capex cycle impacting plant loading (and thereby the energy efficiency of continuous processes)

Our journey to net zero



1. Re-baselined using pre-acquisition data for the business acquired from Universal Refractories, and BMC from 2019 onwards.

The secret tool is

Tackling climate change continued

Our Progress – Key Group initiatives for energy conservation and for increasing energy efficiency

Since 2019, we have undertaken a number of major projects to significantly reduce the Scope 1 CO_2e emissions of the Group by addressing some of its most CO_2e intensive installations.

We closed the Skawina brick plant, eliminated dirty coke oven gas as a fuel in Wuhan, replacing it with a new natural gas-fired tunnel kiln, transferred the Tyler plant activity to Monterrey, and replaced the burner system of the Olifantsfontein rotary kiln. We also took advantage of the closure of our Chinese plant at Kuatang and the relocation of its activity to replace all drying ovens and kilns with new ones, with an energy efficiency improvement target of 20%.

In 2022, the Board approved major capacity expansion capital expenditure projects totalling more than £20m. Available technologies and their impacts in terms of energy efficiency and CO_2e emissions were systematically considered for these projects, and the most efficient technologies for the purpose selected.

Progress in 2023

1 Carbon-free energy sources

The Group supports the transition towards renewable energy sources and cleaner carbon-free technology when possible. Our energy strategy includes an ongoing effort to convert to carbon-free electricity contracts whenever practical and economically manageable, investment in solar panels, and the conversion of processes to electricity as soon as the technology is cost-effective.

In 2023, nine sites converted to carbon-free electricity contracts, taking the total number to 45, representing 74% of our manufacturing sites and R&D centres of excellence.

In 2023, 71% of the grid electricity consumed in our sites was generated from renewable sources, and 75% using processes that did not emit CO_2e (renewable and nuclear).

In 2023, two of our plants became carbon-free and capital expenditure projects for solar panels with a value of £0.9m were approved. Nine sites are equipped with photovoltaic solar panels and 20 sites are investigating solar panel projects.

2 Capital commitments and internal CO_2 pricing

We include an environmental impact analysis in the evaluation of each of our capital expenditure projects as these are the key decisions that drive long-term future sustainability performance, and CO_2 emissions in particular.

An internal price for CO_2 emissions (Scope 1 and Scope 2) is included in the calculation of payback for all investments reaching the threshold for approval by the BU Presidents or Chief Executive.

Vesuvius views this shadow pricing mechanism as a key tool to ensure that the environmental impact of long-term investment decisions is understood. It seeks to ensure that the best available technology is adopted, even in locations where no external cost for carbon is in place or foreseen.

The internal price of CO_2 was introduced in 2020. It is reviewed annually by the Sustainability Council and is applicable across all Business Units in all regions.

The price is adjusted, taking into consideration both the previous year's price and the evolution of the European Union Emissions Trading System (EU-ETS) carbon pricing. In 2020, it was initially set at €30 per tonne of CO_2. It was raised to €90 per tonne in 2021. The Sustainability Council decided to maintain the internal price of CO_2 emissions at €90 per tonne of CO_2 for 2023.

3 Improving our energy efficiency

All Vesuvius plants have targets to reduce energy intensity. We have implemented a structured approach across the Company. We collect and analyse data from the sites, identify gaps and opportunities and eventually target our engineering projects. We select the processes and sites that are the most energy intensive or have the greatest impact, and coordinate the projects centrally. We also share best practices across locations. For example, in one of the most energy-consuming sites, we will improve our process by installing additional nozzles in the spray towers, building on the experience from another Vesuvius site. Many additional initiatives are managed locally.

In 2023, we strengthened the resources available to oversee our energy efficiency improvement programmes across all locations. We rolled out plans to install meters on all energy-intensive equipment (32 sites are fully equipped) and undertook comparison studies across locations.

We are encouraging sites to carry out energy audits and pursue ISO 50001 certification. 13 sites carried out energy audits in 2023, and more than 30 have planned audits in 2024 and 2025. One site has already obtained ISO 50001 certification. This combination of initiatives allows us to better identify and analyse opportunities and target investments on projects with the largest impact.

More than 4,400 employees have received training on energy conservation and greenhouse gas emissions reduction.

In 2023, as a result of thermal processes optimisation and the installation of retrofit solutions, we have reduced energy consumption per year by around 11 GWh and CO_2e emissions by 2,720 tonnes versus 2022.

New capital expenditure worth c.£6m, dedicated to 123 projects with energy efficiency and CO_2 emissions reduction as one of their prime objectives, were approved in 2023.