

VESUVIUS PLC

Annual Report
2023

APR 2023

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.

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Financial highlights

Revenue
£m

£1,930m



Trading profit¹
£m

£200m



Return on sales¹
%

10.4%



Operating profit
£m

£190m



Statutory EPS
p

44.0p



Free cash flow¹
£m

£128m



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



Total R&D spend¹
£m

£37m



Female representation in the Senior Leadership Group %

20%



Reduction of Scope 1 and Scope 2 CO₂e emission intensity per metric tonne of product packed for shipment versus 2019² %

-20.2%



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.

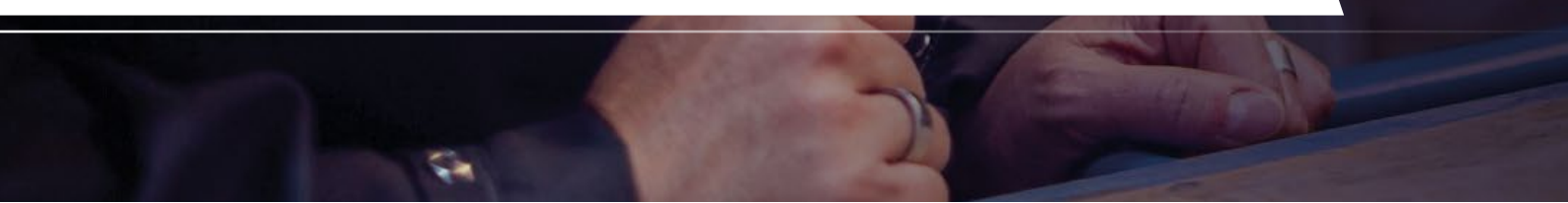
The forward-looking statements reflect knowledge and information available at the date of preparation of this Annual Report and, other than in accordance with its legal and regulatory obligations, the Company undertakes no obligation to update these forward-looking statements. Nothing in this Annual 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.

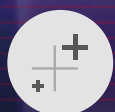


Our world-leading R&D supports the consistent delivery of our high-tech consumables. Our sales are not dependent on the capex cycles of our customers, and our products create value by improving...



Safety

Improved safety at customer plants



Quality

Better steel, better castings



Efficiency

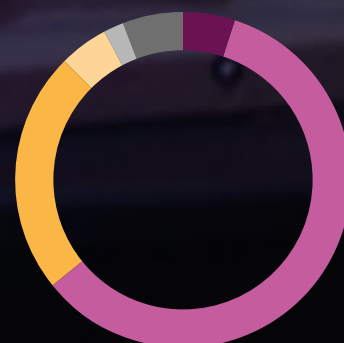
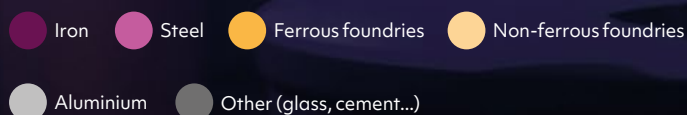
Cheaper steel, cheaper castings



Sustainability

Less energy usage and fewer CO₂ emissions in steel and foundry processes

Sales by customer activity



At a glance continued

The secret flower is "lavender".

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**

At a glance continued

OUR DIVISIONS

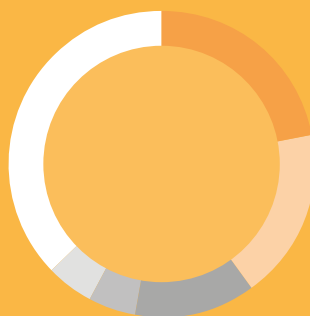
Foundry

The secret object #3 is a "plate".

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

3,872 employees

32% Foundry
68% Steel

£566m

Revenue

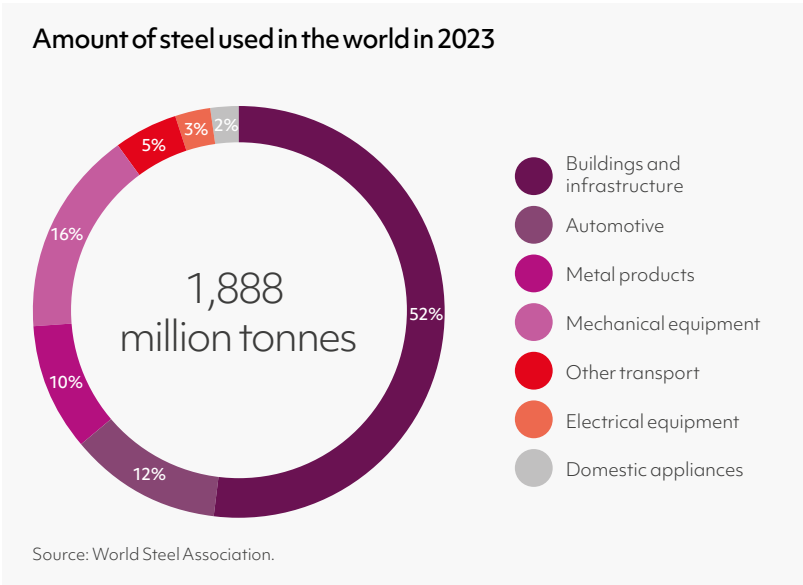
The secret object #5 is a "candle".

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

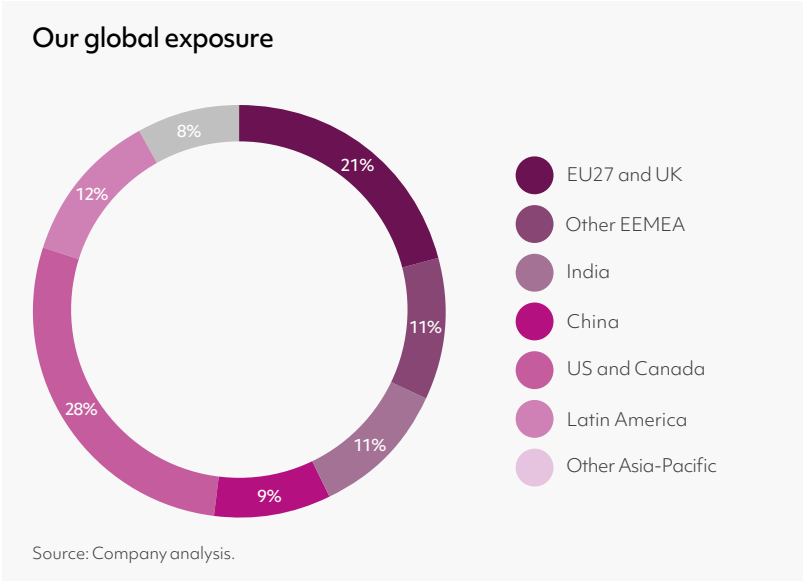
Steel is the world’s most important engineering and construction material

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



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.



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.

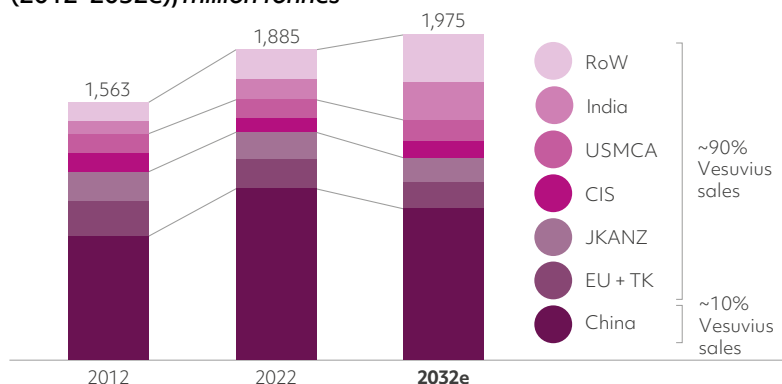
We believe the market dynamics of the next ten years will be very different, due to the fast development of India and, to a lesser extent, of South East Asia, Middle East, Africa and Latin America.

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%.

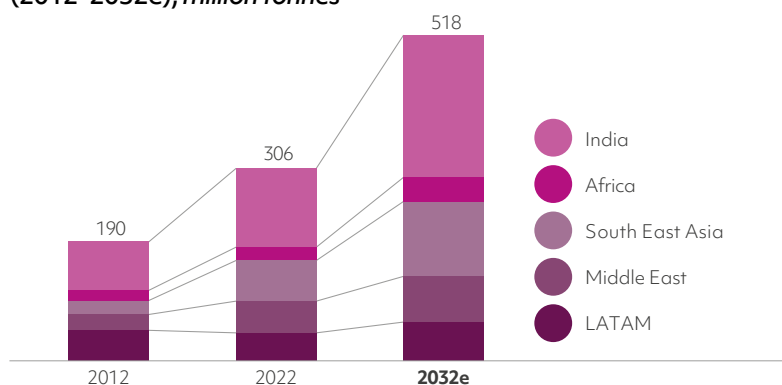
Based on estimates from the World Steel Association and Laplace Conseil, we believe that steel production outside China will increase by at least 200 million tonnes, or around 25%, over the next ten years, half of it in India. This estimate may be conservative with ArcelorMittal estimating demand for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



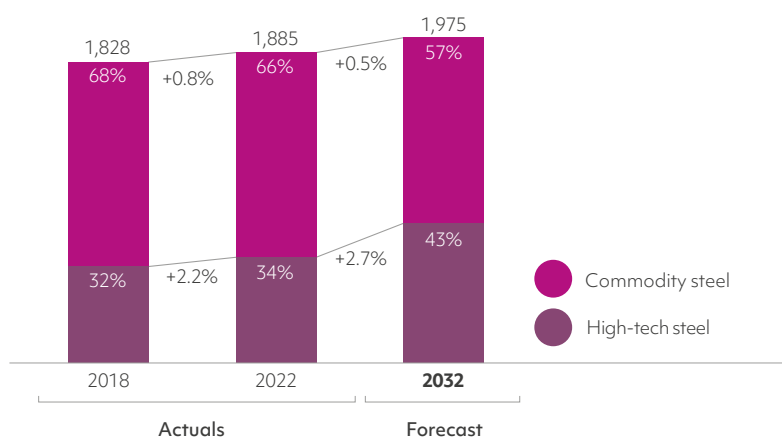
Source: World Steel Association (Yearbook 2022 published March 2023) and Laplace Conseil (analysis conducted in October 2023, including inputs from World Bank, IMF, IEA, OECD & other international associates, company data and announcements).

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 conducted in October 2023, including inputs from World Bank, IMF, IEA, OECD Global Energy Monitor (Steel plant tracked March 2023) and 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 castingThe secret drink is "milk".

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%	<ul style="list-style-type: none">– Engine components and exhaust systems (ICEs and hybrids)– Electric engine components (hybrids and EVs)
Mining and construction	18%	<ul style="list-style-type: none">– 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%	<ul style="list-style-type: none">– Suspension, chassis and brake components
Railways and Marine	5%	<ul style="list-style-type: none">– Wheels, axles, frames and chassis for trains– Hulls, decks, propellers, anchor and chains for ships– Engine components
Power generation	5%	<ul style="list-style-type: none">– Wind turbines – materials in tower structure, gearbox housing– Structural and rotating components
General engineering/ other	37%	<ul style="list-style-type: none">– Agricultural components, including cultivating and harvesting equipment– Structural components for industrial machines– Rotating components – gears and shafts used in machinery

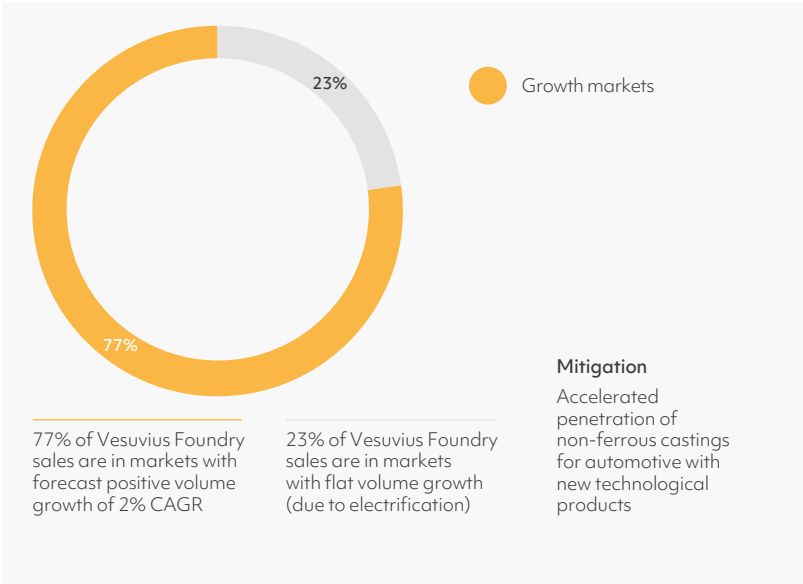
Foundry sales to end-markets

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.

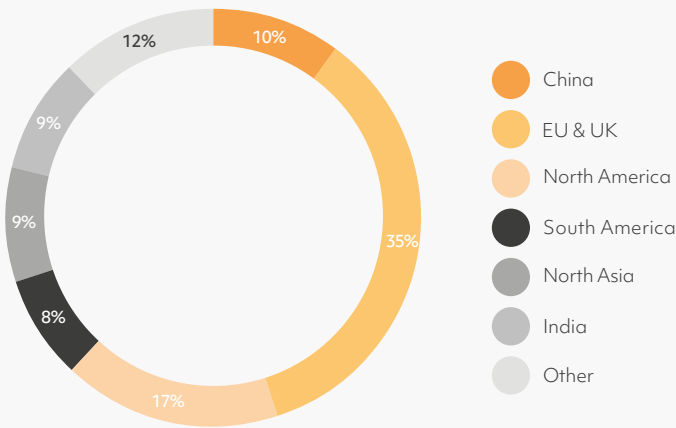
The Foundry Division's R&D strategy is focused on developing new technological products to accelerate its penetration of the growing aluminium casting sector for the automotive market, which is positively impacted by the electrification of vehicles, which we believe will enable the Division to continue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



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
(5-100sps/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.”

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.



Carl-Peter Forster
Chairman

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 CO₂ emissions and energy consumption. We continue to make good progress in the reduction of our carbon footprint and are proud that our latest Sustainability 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.”

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.



Patrick André
Chief Executive

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

The secret animal #4 is a "horse".



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 continuing inflationary environment.

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.

Strong free cash flow generation

Thanks to our stringent cash management discipline and positive progress in the management of our trade working 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.

Cyberupdate

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

Why invest in Vesuvius?

Strategic framework

How we will achieve this

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.

Vesuvius has strong and 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

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](#)

The secret currency is a "rupee".

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

◆ 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 CO₂ 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

Flow Control
Sensors & Probes
Advanced Refractories

[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

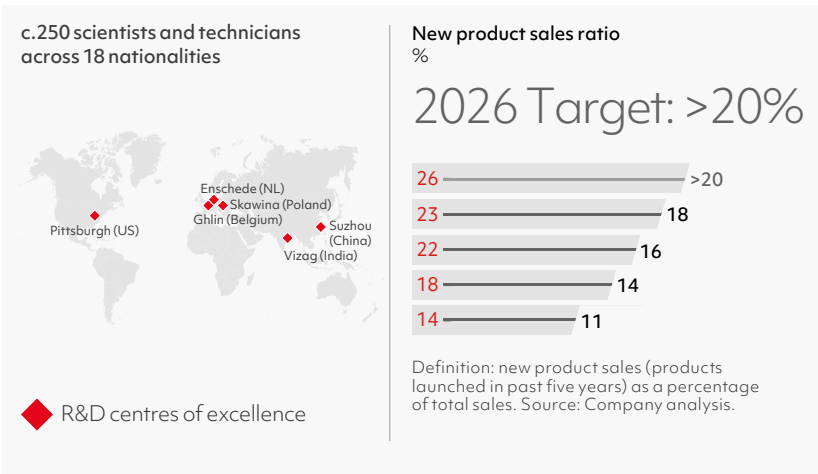
We have four strategic pillars which will help us achieve our financial targets. These are underpinned by our universal focus on safety, our investment in our people and our long-term sustainability strategy.

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.

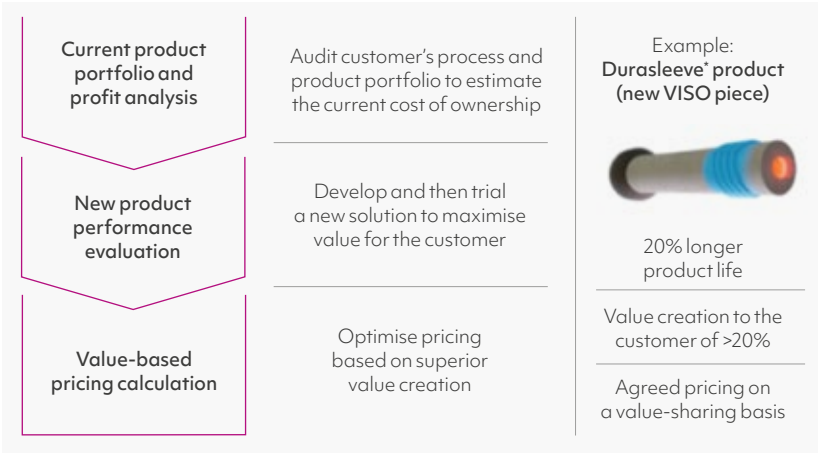


Optimised pricing and market share gains

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.



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

2 Customer service

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

Further optimisation of manufacturing footprint

c.75% benefit

c.25% benefit

4 Investment in growth regions

The secret office supply is an "envelope".

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%.

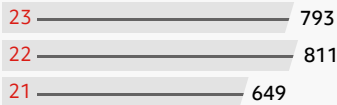
Steel Division	2023 (£m)	2022 (£m)	Change(%)	Underlying change(%)
Flow Control revenue	793.0	810.9	(2.2%)	0.6%
Advanced Refractories revenue	567.9	645.3	(12.0%)	(9.4%)
Sensors & Probes revenue	39.1	40.2	(2.8%)	(0.6%)
Total Steel Revenue	1,400.0	1,496.4	(6.4%)	(3.7%)
Total Steel Trading Profit	147.6	172.7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



Flow Control

Revenue
£m

£793m



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%.

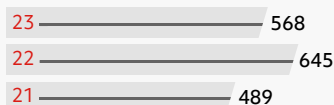


Operating review continued

Advanced Refractories

Revenue
£m

£568m



The secret sport is "skiing".



Richard Sykes
President, Advanced Refractories

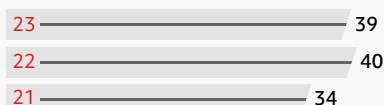
Advanced Refractories reported revenue of £567.9m in 2023, a decrease of 9.4%, principally reflecting volume declines, with overall stable pricing. Volume decline was higher than the underlying steel market in both the Americas and EMEA due to market share losses associated with priority having been 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 Cancellieri
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 KPIs¹

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 significant business closures	
	Return on sales % 23 10.4 22 11.1 21 8.7	Reflects the operating profit 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

The secret object #4 is a "mirror".

“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 by 5.7%, of which 2.6% related to FX headwinds and 3.1% underlying performance. Underlying revenue was driven by a decline in volume (-5.5% partially 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.

The net impact of average 2023 exchange rates compared to 2022 averages has been a headwind of £12.5m at a trading profit level, in 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.

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



Mark Collis
Chief Financial Officer

Financial review continued

Revenue

£m	2023	2022			% change	
	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

£m	2023	2022			% change	
	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

£m	2023	2022			% change	
	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

The secret animal #3 is an "owl".

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 arrangements.

1 Become a zero - accident company

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 CO₂e emissions by 2050 (Scope 1 and Scope 2)

Between 2019 and 2023, our overall CO₂e emission intensity metric (CO₂e 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 the production of dolime during 2023, as a result of the temporary closure of one of our rotary kilns. If the kiln had been operating normally throughout the year, the pro forma 2023 CO₂e 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 CO₂e emission electricity (generated from coal) with greener electricity or other sources of energy.

3 Help our customers reduce their CO₂e 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:



Vesuvius' Environmental Policy

We commit to:

- Minimise direct and indirect CO₂ 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 CO₂ 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 maintained in the following years. In 2024, we will begin work on selecting the 2030 targets and KPIs.

Our planet

- To tackle climate change by reducing our CO₂e 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 CO₂ 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 diverse, engaged and high-performing teams



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 ➔

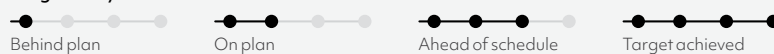


Progress on our Sustainability targets

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}	
	CO₂e emission intensity	By 2025, reduce Scope 1 and Scope 2 CO ₂ e emission intensity per metric tonne of product packed for shipment (vs 2019)	-20%		-20.2% ^{1,2,3}	Annual Incentive Plan and Vesuvius Share Plan – Read more about these on p123–128
	Wastewater	By 2025, reduce wastewater per metric tonne of 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



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 CO₂ 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%, CO₂e 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.

The secret shape is a "star".

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.	<i>Sustainability: TCFD</i>	p37 ➤
			<i>Risk, viability and going concern</i>	p72-78 ➤
			<i>Directors' Remuneration Report</i>	p108-135 ➤
		b Describe management's role in assessing and managing climate-related risks and opportunities.	<i>Sustainability: TCFD</i>	p37-40 ➤
			<i>Risk, viability and going concern</i>	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.	<i>Sustainability: Our planet</i>	p39-43 ➤
		b Describe the impact of climate-related risks and opportunities on the organisation's businesses, strategy and financial planning.	<i>Sustainability: Our planet</i>	p39-53 ➤
			<i>Our external environment</i>	p10-13 ➤
			<i>Sustainability: Our customers</i>	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.	<i>Sustainability: Our planet</i>	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.	<i>Sustainability: Our planet</i>	p39-43 ➤
			<i>Risk, viability and going concern</i>	p72-78 ➤
		b Describe the organisation's processes for managing climate-related risks.	<i>Sustainability: Our planet</i>	p39-43 ➤
			<i>Risk, viability and going concern</i>	p74 ➤
		c Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organisation's overall risk management.	<i>Sustainability: Our planet</i>	p39-43 ➤
			<i>Risk, viability and going concern</i>	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.	<i>Sustainability</i>	p35 and 41 ➤
		b Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 GHG emissions, and the related risks.	<i>Sustainability: Our planet</i>	p50-53 ➤
		c Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets.	<i>Sustainability: Our planet</i>	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.

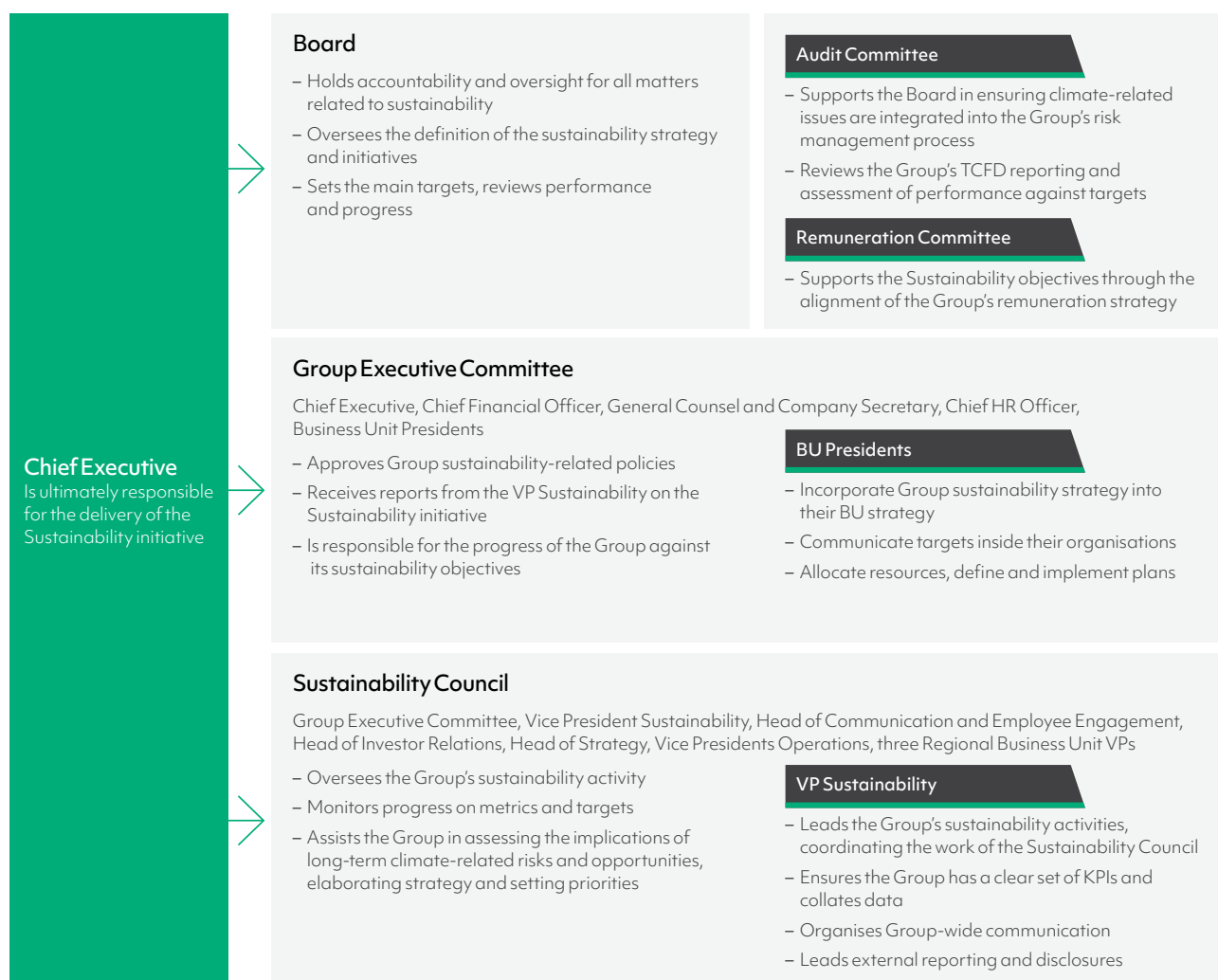
The Board's oversight of the Group's response to climate change is integrated into both its monitoring of the Group's broader sustainability strategy and initiatives, and its approach to significant capital and other investments. The Board formally discusses the Group's Sustainability initiative at least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



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 CO₂e emissions reduction. In addition, the Executive Directors and other members of the Group Executive Committee participate in the Group's Long-Term Incentive Plan, with the vesting of 20% of each award based on three ESG measures, focused on:

- Reduction of the Lost Time Injury Frequency Rate;
- Reduction of the Group's Scope 1 and 2 CO₂e 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 activities, coordinating the work of the Sustainability Council including the Group's assessment of climate change risks and opportunities and formulation of climate-related scenarios. He is also 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 CO₂ and CO₂e 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 reaching net zero greenhouse gas emissions by 2050 at the latest and helping our customers reduce their emissions through 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 CO₂e emissions of all of our operations and the quantity of raw materials used, alongside helping our customers to reduce their own CO₂ 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 CO₂ 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 CO₂ 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,

The secret animal #1 is an "elephant".

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 transition 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 2025 as a deadline. This horizon encompasses our capital 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.

Very high (>£25m)

Major (£15–25m)

High (£10–15m)

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.

Moderate (£5–10m)

Minor (£1–5m)

Insignificant (£0–1m)

Opportunities

			Potential annual impact on trading profit in the short, medium and long term		
Opportunity	Description	Impact	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)

Major (£15–25m)

High (£10–15m)

Moderate (£5–10m)

Minor (£1–5m)

Insignificant (£0–1m)

Risks

				Potential annual impact on trading profit in the short, medium and long term		
Risks	Description	Impact	Mitigating actions being undertaken	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-ferrous processes (due to conversion to electric vehicles)	Shift from castings using a high level of consumables to low consumable processes creates risk of revenue loss for the Foundry Division	Reduced revenue from shrinking market as some traditional castings will disappear or be converted to alternative processes	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 cases 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	<ul style="list-style-type: none"> – Fast growth of non-CO₂ 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 	<ul style="list-style-type: none"> – Fast growth of non-CO₂ 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 	<ul style="list-style-type: none"> – Fast growth of non-CO₂ 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	<ul style="list-style-type: none"> – 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 	<ul style="list-style-type: none"> – 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 	<ul style="list-style-type: none"> – 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 CO₂ 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-CO₂ emitting energy sources vs fossil fuels and their associated infrastructures. These will greatly influence the pace of deployment of selected technologies and industries (electric vehicles, 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 CO₂ intensive than the Electric Arc Furnace (EAF) route. However, EAFs cannot always be used to produce all higher quality steel grades and they rely on the availability of scrap steel (itself a function of the level of economic development). Going forward, quality levels produced by EAFs will continue to improve.

Various technologies to decarbonise 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 CO₂ emitting (1% to 3% of a steel plant's CO₂ 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 CO₂e 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 (CO₂, CH₄, N₂O, HFCs, PFCs, SF₆ and NF₃).

Our preferred metrics to monitor progress with our journey to net zero are energy and CO₂e emission intensity (energy consumption and CO₂e 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 CO₂e 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 CO₂e 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 CO₂e 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 CO₂e 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 CO₂e intensive energy sources
- 3 When possible, replacing high CO₂e 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:

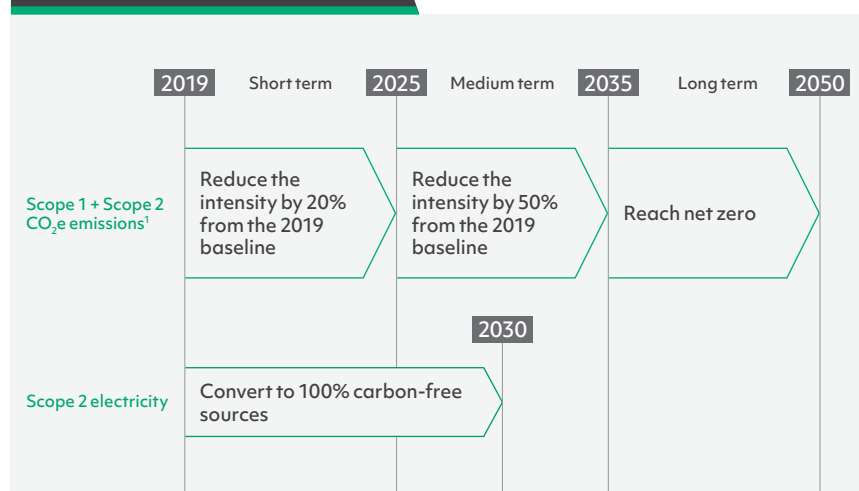
- The availability of the necessary technologies, at an affordable level and at a scale appropriate for our industry, especially for the firing of refractory ceramics and carbon capture
- The development of additional production capacity and distribution infrastructure for renewable energy and hydrogen, and their cost competitiveness
- Adequate policy support to foster innovation and ensure the cost of CO₂ emissions will increase the attractiveness of carbon-free processes
- No significant change to our business model and product portfolio

The achievement of our CO₂e 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 CO₂ intensive product line)
- Macroeconomic conditions and the capex cycle impacting plant loading (and thereby the energy efficiency of continuous processes)

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

Our journey to net zero





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 CO₂e emissions of the Group by addressing some of its most CO₂e 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 CO₂e 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 CO₂e (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 CO₂ 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 CO₂ emissions in particular.

An internal price for CO₂ 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 CO₂ 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 CO₂. It was raised to €90 per tonne in 2021. The Sustainability Council decided to maintain the internal price of CO₂ emissions at €90 per tonne of CO₂ 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 CO₂e emissions by 2,720 tonnes versus 2022.

New capital expenditure worth c.£6m, dedicated to 123 projects with energy efficiency and CO₂ emissions reduction as one of their prime objectives, were approved in 2023.

Next steps to achieve our Net Zero Plan

Our plan to reach Net Zero

Our plan to reach Net Zero covers 100% of our operations. We aim to achieve our decarbonisation goals without the use of any carbon offsets (or only to address residual emissions).

Short term (2025)

A wide variety of projects have been initiated and more are being considered, to help us deliver our energy efficiency and CO₂e emissions reduction targets, including:

- Optimisation of process parameters
- Introduction of new refractory furniture
- Retrofitting of ovens and kilns
- Replacement of older and less efficient units
- Upgrades of compressors
- Replacement of light sources with LED lights
- Replacement of diesel-powered forklift trucks with electric forklift trucks
- Installation of heat recovery systems in ovens and kilns
- Burner setting optimisation and loading and cycle optimisation
- Continued conversion of electricity supplies to carbon-free sources
- Installation of solar panels

We endeavour to use the best available technologies to reduce CO₂ emissions in all our major capital expenditure projects.

The secret landmark is the "Colosseum".

Medium term (2035)

We anticipate that further emissions reduction will be possible through further energy efficiency measures (continuation of the short-term actions).

Technological developments currently in preparation with our partners will allow us to reduce GHG emissions even further. Projects have been launched across a range of activities including:

- Electrification of high-temperature manufacturing processes that currently rely on natural gas or LPG. The first investments to replace natural gas-powered ovens with electric ovens were in preparation at the end of 2023
- The use of a combination of natural gas and renewable energy such as carbon-free hydrogen to fire refractory materials. We have already started R&D trials with a blend of hydrogen and natural gas
- The use of bio-fuels instead of natural gas. The first trials to convert industrial installations are planned for 2024

We estimate the incremental capital commitment required by our decarbonisation roadmap until 2035 will be approximately £70m (approx. £7m per year). We do not expect the useful economic lives of our existing assets to be materially affected by our plans until 2035. Precise capital expenditure project lists have been defined for the 2025 horizon. We will continue using the internal price of carbon to assess the relative benefit and prioritise projects.

We also anticipate that changes in our product portfolio towards less energy-intensive products (such as resin-bonded and unshaped refractories) will continue.

Long term (2050)

Beyond 2035, the short term and medium term programmes will continue to deliver opportunities.

We are regularly monitoring the emergence and readiness of new technologies, through our network of suppliers of capital goods, universities and trade associations. In the longer term (2050), various technologies are promising candidates for the near zero emissions curing and firing of refractory products (electricity, carbon-free hydrogen, synthetic gas, biomass). We currently foresee that carbon capture solutions will be available for our industrial application during the 2035-2050 period, though most will probably not be available sooner. We are progressively adapting our product and process R&D programmes to explore such opportunities.

Capital expenditure requirements and the useful economic lives of our existing assets will depend on the evolution of technologies currently in development.



Tackling climate change continued

Our energy consumption and Scope 1 and Scope 2 CO₂e emissions

While Vesuvius' products differ significantly in the energy intensity of their manufacture, most of our manufacturing processes are not energy intensive nor do they produce significant quantities of waste and emissions. Dolime production, which uses coal to calcine dolomite, is our major emitter of CO₂. Dolime and the next six of our 39 main manufacturing processes account for 58% of our energy consumption and 62% of our location-based CO₂e emissions. These continue to be a clear focus for our investment to reduce CO₂e emissions.

In January 2023, an incident incapacitated one of our dolime rotary kilns, which resulted in it being out of service for the remainder of the year. As a consequence, the tonnage of dolime produced by the Group in 2023 was considerably lower than in prior years and the Group's product mix was very different. The Group's absolute energy consumption, CO₂e emissions, energy intensity and CO₂e emission intensity reduction were therefore affected by the lower output of dolime as well as performance improvement.

The Group's progress in reducing our CO₂e emission intensity was adversely affected in 2023 by lower volumes resulting in lower fill rates for continuous processes and lower energy efficiency. Between 2019 and 2023 the Group achieved an overall reduction in energy intensity (normalised to per metric tonne of product packed for shipment) of 14.6%. The pro forma energy intensity reduction, assuming the Group had produced dolime at the normal rate, was 7.2% vs a target of 10% by 2025.

During the same period, our overall CO₂e emission intensity metric (CO₂e emissions per metric tonne of product packed for shipment, Scope 1 and Scope 2, market-based) reduced by 45.5%. This includes a 38.4% reduction in Energy CO₂e intensity, and a 68.1% reduction in Process CO₂e intensity, per metric tonne of product packed for shipment. Excluding dolime, the CO₂e emission intensity reduction between 2019 and 2023 was 33.2%. If the dolime installation had been operating normally throughout the year, the pro forma 2023 CO₂e emission intensity would have been 20.2% lower than in 2019, vs a target of 20% by 2025.

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 covers all other direct CO₂ and CO₂e emissions that occur in the Company's value chain.

The conversion by many of our sites to carbon-free electricity contracts has helped our CO₂e emissions reduce at a faster pace than our energy efficiency improvements.

Vesuvius' total energy costs in 2023 were £48.5m, c.2.5% of revenue (£54.6m in 2022, c.2.8% of revenue). South Africa is the only country where we exceed the threshold to be submitted to a carbon tax or an emissions trading scheme. The carbon tax cost in 2023 was c.£0.2m (£0.2m in 2022), based on emissions in the prior year.

Scope 1, Scope 2 and Scope 3 emissions (market-based)^{1,2}

In 2023, Vesuvius' total Scope 1, Scope 2 and Scope 3 CO₂e emissions were 1,589,332 metric tonnes.

Metric tonnes CO ₂ e	2023		2022		2021		2020		2019	
	Metric tonnes ¹	% ¹	Metric tonnes ¹	% ¹	Metric tonnes	%	Metric tonnes	%	Metric tonnes	%
Scope 1 Process CO ₂ e emissions	29,637	1.9%	91,276	5.5%	101,121	5.1%	88,516	5.3%	106,737	6.0%
Scope 1 Energy CO ₂ e emissions	139,241	8.8%	191,396	11.5%	208,192	10.4%	182,660	10.9%	214,845	12.1%
Scope 1 Fugitive emissions	1,037	0.1%	2,207	0.1%	1,398	0.1%	1,080	0.1%	992	0.1%
Scope 1 CO₂e emissions	169,914	10.7%	284,879	17.2%	310,710	15.5%	272,257	16.2%	322,573	18.2%
Scope 2 CO₂e emissions (market-based)	37,961	2.4%	55,861	3.4%	83,175	4.2%	92,360	5.5%	108,631	6.1%
Scope 3 CO₂e emissions	1,381,457	86.9%	1,318,207	79.5%	1,605,873	80.3%	1,311,807	78.3%	1,341,498	75.7%
Total	1,589,332	100%	1,658,947	100%	1,999,759	100%	1,676,424	100%	1,772,702	100%

1. The business of Universal Refractories Inc (Vesuvius Penn Corporation) which was acquired in 2021, is included in 2022 and onwards. BMC (Yingkou YingWei Magnesium Co., Ltd), which was acquired in late 2022 is included in 2023 and onwards.

2. The numbers are collated from entities within the Group's Operational Control Boundary.

Vesuvius plc long-term energy consumption and energy intensity (aggregate of Scope 1 and Scope 2)^{1,2,3}

	2023 Pro forma v 2019 ²	Actual 2023 v 2019	2023 Pro forma ²	2023 ¹	2022 ¹	2021 ¹	2020 ¹	2019 ¹
Total energy consumption (million kWh)				896	1,085	1,189	1,056	1,205
Energy consumption per metric tonne of product packed for shipment (kWh/MT)	-7.2%	-14.6%	1,145	1,054	1,161	1,118	1,173	1,234

Notes:

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 throughout 2023 and re-baselined using pre-acquisition data for the business acquired from Universal Refractories, Inc. (Vesuvius Penn Corporation) and BMC (Yingkou YingWei Magnesium Co., Ltd) from 2019 onwards.
3. The numbers are collated from entities within the Group's Operational Control Boundary.

Greenhouse Gas (GHG) reporting

We have reported to the extent reasonably practicable on all the emission sources required under Part 7 of the Accounting Regulations which fall within our Group Financial Statements.

Statutory reporting is location-based according to the GHG Protocol.

All sites report their energy consumption and GHG emissions on a quarterly basis. Performance and variation are analysed, and improvement plans built accordingly.

2019 was selected as the baseline for all energy and GHG emissions data and targets, absolute and relative, as this was the last year of normal trading prior to the COVID-19 pandemic. Progress is measured against the 2019 performance.

The Group also meets all its obligations in relation to the Producer Responsibility Packaging Waste regulations and the Energy Saving Opportunity Scheme by which the UK implemented the EU Energy Efficiency Directive.

Vesuvius plc statement of verification

Scope 1, Scope 2 and Scope 3 carbon footprint reporting and supporting evidence contained herein for the period 1 January 2019 to 31 December 2023 covering GHG emissions as CO₂e in metric tonnes, CO₂e intensity in metric tonnes of CO₂e per metric tonne of product packed for shipment, energy consumption in kWh and energy intensity in kWh of energy per metric tonne of product packed for shipment, Location based and Market based, were verified by Carbon Footprint Ltd in accordance with the ISO 14064 Part 3 (2019): Greenhouse Gases: Specification with guidance for the verification and validation of greenhouse gas statements.

A copy of the limited assurance statement can be found on our website: www.vesuvius.com.

The secret instrument is a "drum".





Tackling climate change continued

Fuel consumption, emissions and normalised emissions for the main fuels consumed across the Group (location-based (Operational Control Boundary) statutory reporting)

In 2023, the Group's normalised energy consumption decreased by 12.7% to 1,054 kWh per metric tonne (2022: 1,207). Location-based emissions decreased by 27.4% to 0.310 metric tonnes of CO₂e per metric tonne of product packed for shipment (2022: 0.426) and market-based emissions decreased by 35.5% to 0.245 metric tonnes of CO₂e per metric tonne of product packed for shipment (2022: 0.380).

A significant reduction in CO₂e resulted from reductions in the production of dolime following the incident in January 2023, which incapacitated one of our rotary kilns. The remaining decreases were primarily driven by changes in production volumes and product mix. Natural gas use decreased by 8%, electricity consumption by 4% and coal (a CO₂ intensive fuel) consumption by 67%, to 8,900 metric tonnes (2022: 27,231 metric tonnes).

During 2023, the Group also consumed 287 cubic metres of diesel (-1.8% on 2022: 292) primarily in the operation of forklift trucks on its sites, and 165 cubic metres of fuel oil, an increase of 0.2% (2022: 164.8). In total, 482 cubic metres of oil was used as fuel in 2023 (5.5% up on 2022: 457).

Global GHG emissions and energy consumption Location-based statutory reporting (Operational Control Boundary)^{1,2,3,4,5,6}

Emissions and energy sources	UK and Offshore CO ₂ e '000 metric tonnes 2023	Global CO ₂ e '000 metric tonnes 2023 ²	Proportion relating to the UK and Offshore Area	UK and Offshore CO ₂ e '000 metric tonnes 2022	Global CO ₂ e '000 metric tonnes 2022 ²	Proportion relating to the UK and Offshore Area	UK and Offshore energy used '000 kWh 2023	Global energy used '000 kWh 2023 ²	Proportion relating to the UK and Offshore Area	UK and Offshore energy used '000 kWh 2022	Global energy used '000 kWh 2022 ²	Proportion relating to the UK and Offshore Area
Combustion of fuel and operation of facilities including fugitive emissions (Scope 1)	2.150	170	1.3%	2.266	285	0.8%	11,343	699,011	1.6%	11,839	877,757	1.3%
Electricity, heat, steam and cooling purchased for own use (Scope 2)	0.385	93	0.4%	0.554	98	0.6%	1,905	196,612	1.0%	2,740	205,859	1.3%
Total GHG emissions and energy	2.535	263	1.0%	2.819	383	0.7%	13,248	895,622	1.5%	14,578	1,083,616	1.3%
Change	-10.1%	-31.3%					-9.1%	-17.3%				

Vesuvius' chosen intensity measurement (location-based statutory reporting) ^{1,2}	Metric tonnes CO ₂ e per metric tonne of product packed for shipment				kWh of energy per metric tonne of product packed for shipment			
	UK and Offshore 2023	Global 2023 ²	UK and Offshore 2022	Global 2022 ²	UK and Offshore 2023	Global 2023 ²	UK and Offshore 2022	Global 2022 ²
Emissions and energy reported above normalised to metric tonnes CO ₂ e per metric tonne of product packed for shipment	3.505	0.310	4.090	0.426	18,315	1,054	21,150	1,207
Change	-14.3%	-27.4%			-13.4%	-12.7%		

Metric tonnes of CO ₂ e per £m revenue				
Total GHG emissions as metric tonnes CO ₂ e per £m revenue (location-based)	20.6	136.3	22.2	192.1
Change	-7.0%	-29.0%		

1. Location-based Statutory Reporting of Global GHG emissions (metric tonnes of CO₂e) and energy consumption ('000 kWh). The numbers are collated from entities within the Group's Operational Control Boundary.
2. The business of Universal Refractories Inc (Vesuvius Penn Corporation) which was acquired in 2021, is included in 2022 and onwards. BMC (Yingkou YingWei Magnesium Co., Ltd), which was acquired in late 2022 is included in 2023 and onwards.
3. In reporting GHG emissions, we have used the GHG Protocol Corporate Accounting and Reporting Standard (revised edition) methodology to identify our location-based GHG inventory of Scope 1 (direct) and Scope 2 (indirect) CO₂e. We report in metric tonnes of CO₂ equivalent (CO₂e). We have used emission factors from the UK Government's (Defra) and the IEA GHG Conversion Factors for Company Reporting 2023 in the calculation of our GHG emissions.
4. Our energy-related greenhouse gas (GHG) emissions, reported as carbon dioxide equivalents (CO₂e), include direct emissions of the three main GHGs (carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O)).
5. Process related emissions of the following in CO₂ equivalent and in metric tonnes are not significant: Direct methane CH₄ emissions and Direct nitrous oxide N₂O emissions.
6. Emissions of the following in CO₂ equivalent and in metric tonnes are not significant: Direct sulphur hexafluoride (SF₆) emissions; Direct HFC emissions; and Direct PFC emissions.

Scope 3 emissions

Vesuvius' Scope 3 CO₂e emissions, mainly upstream, contribute to a greater part of our total CO₂e emissions than our Scope 1 and Scope 2 emissions. Our products are used by customers whose processes emit significant amounts of CO₂. They serve to contain and protect liquid metal and manage its flow, but do not participate in the heating operations or chemical reactions that lead to CO₂ emissions. Emissions associated with the processing or use of our products are hence very limited. More specifically:

- Some products require drying or pre-heating prior to use by our customers. Emissions generated during these operations are included in the Processing of sold products category
- Refractory materials do not require energy during their use; having undergone high temperature processes during their manufacturing, they are inert and do not release any greenhouse gases during their use.

– Some non-refractory products contain chemicals, which will be partially burnt during usage by our customers. Emissions due to the combustion of chemicals are included in the Use of sold products category.

Since 2021, we have undertaken a focused evaluation of emissions associated with raw materials, using publicly available average CO₂ emissions factors. We have also collected information on energy source, CO₂ emissions data and reduction plans from our raw materials suppliers as part of our Request for Quotation process.

In 2023, we concentrated on the four raw material categories that account for an estimated half of our Scope 3 emissions from acquired products and services. We provided our suppliers with training and evaluation tools to help them assess their Scope 1 and Scope 2 emissions. In China our workshop on 'Sustainability and CO₂ emissions' had 55 attendees representing 35 suppliers.

Suppliers representing 54% of our raw material spend have provided disclosures to date.

We have also started collecting CO₂ emissions data relating to transportation from our forwarders in all regions. In 2023, the CO₂ emissions data that we received from our forwarders covered 45% of our transportation spend (upstream and downstream), and we were able to evaluate CO₂ emissions covering a further 43% of our transportation spend using operational data and DEFRA conversion factors. The remainder of our CO₂ emissions from upstream and downstream transportation (12%) was estimated based on spend and DEFRA conversion factors.

Various initiatives have been launched to reduce our Scope 3 CO₂ emissions, including returnable packaging, the electrification of company fleet vehicles and arrangements for collective commuting.

Scope 3 emissions^{1,2,3,4,5,6}

Metric tonnes CO ₂ e	2023 ²		2022 ²		2021		2020		2019	
	Metric tonnes	%	Metric tonnes	%	Metric tonnes	%	Metric tonnes	%	Metric tonnes	%
Purchased goods and services	1,066,129	77%	1,038,969	79%	1,342,387	84%	1,104,823	84%	1,127,065	84%
Capital goods	39,992	3%	33,369	3%	22,007	1%	19,818	2%	25,087	2%
Fuel- and energy-related activities (not included in Scope 1 or 2)	37,088	3%	45,551	3%	50,931	3%	36,845	3%	42,332	3%
Upstream transportation and distribution	39,086	3%	45,572	3%	39,887	2%	23,946	2%	26,104	2%
Waste generated in operations	15,228	1%	15,364	1%	14,428	1%	11,961	1%	3,632	0%
Business travel	11,443	1%	9,578	1%	5,128	0%	4,670	0%	10,724	1%
Employee commuting	20,374	1%	21,253	2%	21,653	1%	21,561	2%	22,303	2%
Upstream leased assets	0	0%	0	0%	0	0%	0	0%	0	0%
Downstream transportation and distribution	80,896	6%	38,899	3%	34,912	2%	23,529	2%	25,700	2%
Processing of sold products	14,924	1%	15,779	1%	14,078	1%	13,902	1%	14,371	1%
Use of sold products	34,194	2%	32,914	2%	37,460	2%	31,834	2%	39,645	3%
End-of-life treatment of sold products	22,103	2%	20,959	2%	23,002	1%	18,918	1%	4,535	0%
Downstream leased assets	0	0%	0	0%	0	0%	0	0%	0	0%
Franchises	0	0%	0	0%	0	0%	0	0%	0	0%
Investments	0	0%	0	0%	0	0%	0	0%	0	0%
Total Scope 3 CO₂e emissions	1,381,457	100%	1,318,207	100%	1,605,873	100%	1,311,807	100%	1,341,498	100%

1. In 2023, the GHG Protocol managed Quantis Scope 3 evaluator tool was withdrawn, so Vesuvius now utilises the Sustrax platform, which offers the possibility to evaluate Scope 3 emissions at a greater level of detail. The Sustrax tool relies on the UK Government DEFRA methodology, categories, and emission conversion factors. Wherever possible we used activity data which relies on information that is specific to the organisation, and therefore is much more accurate than the spend base method. Our Scope 3 emissions for the 2019 to 2022 period were re-evaluated using the improved new approach to ensure comparability over time.
2. The business of Universal Refractories Inc (Vesuvius Penn Corporation) which was acquired in 2021, is included in 2022 and onwards. BMC (Yingkou YingWei Magnesium Co., Ltd), which was acquired late 2022 is included in 2023 and onwards.
3. The numbers are collated from entities within the Group's Operational Control Boundary.
4. Conversion factors for GHG emissions and energy used the 2023 UK Government GHG Conversion Factors for Company Reporting. Conversion factors for GHG emissions for electricity globally used the IEA Emission Factors 2023.
5. Calculation of Scope 3 GHG emissions used the Carbon Footprint Limited Sustrax system for years 2019-2023.
6. Scope 3 2023 Upstream subtotal 1,229,340 Metric Tonnes (89%) Downstream subtotal Metric Tonnes 152,117 (11%).



Product responsibility – Growing our engagement in the circular economy

The drive to improve the sustainability performance of Vesuvius and the refractory industry's products was initiated many decades ago. Continuous improvements have led to considerable reductions in both the raw materials used and the quantity of product shipped to landfill. As the amount of refractory material consumed per tonne of steel cast levels off, the purpose and value of the use of refractory materials will move from delivering insulation to an even greater emphasis on helping to improve steel quality and process efficiency.

Product durability

Our first, and preferred, strategy to reduce the depletion of resources is the extension of product durability.

We are continuously working to extend the lifetime of our consumable products. Strategies include the development of advanced materials, the design of shapes that allow dual usage of products, and product repair and remanufacture. For mechanisms and equipment, we also offer wear monitoring and maintenance services to our customers to ensure their optimum performance and extend their lifetime.

Product recyclability

At the same time as reducing the quantity of raw materials required for each casting, technical solutions have emerged to enable the recycling of refractory materials after usage in the production of iron and steel. Whereas in the early 1970s nearly all refractory materials were disposed of after use, it is estimated that more than half are now recycled. In Europe, as little as 5% of refractory materials now go to landfill.

As part of our product end-of-life management programme, we are developing selected initiatives with customers, tailored to each product family, such as:

- Recovery and remanufacture of products after usage
- Recovery and recycling of refractory materials after usage
- Recycling of mechanisms as scrap steel
- Refurbishment of lasers and redeployment, or disassembly and recycling of components

Recovered and recycled materials

Vesuvius is determined to increase the usage of recovered and recycled materials in its product formulations.

Increasing the share of recovered and recycled materials in product formulations poses multiple challenges, in terms of availability, consistency of quality, competitiveness versus virgin materials whose prices fluctuate, regulatory frameworks for the transportation of end-of-life waste materials, and validations to ensure that product performance and reliability remain unaffected. 2023 performance was adversely affected by these factors, which remain a concern going forwards.

Recycled material usage^{1,2}

	2023 Pro forma ³	2023	2022	2021	2020	2019
Amount of recycled materials used in Vesuvius products (metric tonnes)		65,497	66,137	76,482	57,035	68,373
Amount of recovered materials that are not recycled used in Vesuvius products (metric tonnes) ⁴		0	0	0	0	0
Percentage of recycled materials in Vesuvius products from total materials	5.7%	6.5%	5.8%	5.9%	5.3%	5.7%
Percentage of revenue from products including recycled materials		20.7%	20.4%	21.0%	19.6%	18.7%

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) from 2019 onwards.

2. The numbers are collated from entities within the Group's Operational Control Boundary.

3. Pro forma: performance as if the dolime process had been operating normally in 2023 (based on the average output and performance of 2019 to 2022).

4. All recovered materials undergo some processing before their usage in our products. Therefore, they are all included in the recycled materials category, and the recovered materials category is empty.



Reducing consumption

Material waste

The Board has set a target of a 25% reduction of our solid waste (hazardous and sent to landfill) per metric tonne of product packed for shipment by 2025 (vs the 2019 baseline).

Manufacturing sites have started building action plans covering both hazardous and non-hazardous waste to eliminate, reduce and recycle. A wide range of actions have been initiated to reduce the amount of waste, such as closed conveyor and dust extraction systems, process improvements to reduce scrap and process waste generation, re-engineering of product recipes to include internally recycled material, and identification of recycling opportunities in other industries for by-products.

In 2023, the ratio of solid waste (hazardous and sent to landfill) per metric tonne of product packed for shipment reduced by 13.4% vs 2019, (2022: reduced by 9.1%). The 2023 performance was notably affected by the partial interruption to dolime production in 2023. During the year a few sites also disposed of waste material that had been accumulated over a long period of time. Waste material quantities were reassigned to the year during which they were generated, and waste figures adjusted accordingly.

Water consumption

We aim to reduce both the amount of fresh water consumed in our manufacturing process and social water consumption. The main area of focus is the reduction of wastewater. Vesuvius works to reduce the

consumption of water in its manufacturing operations by recycling and improving water management processes. No salt water or cooling water is abstracted, with no related outflow. Various technological solutions have been implemented to reduce our water consumption and wastewater. Most noteworthy, in the past five years: 30 sites have implemented measures to minimise water consumption in grinding, cleaning, degreasing, and rinsing processes; 18 sites have upgraded technology or equipment to significantly reduce water consumption; and ten sites have implemented rainwater harvesting systems.

In 2023, our overall fresh water consumption per tonne of product packed for shipment decreased by 0.6% vs our baseline of 2019. As with energy use, normalised consumption of water varies with product mix.

Five-year evolution of fresh water consumption

	% change 2023/2019	2023 ¹	2022 ¹	2021 ¹	2020 ¹	2019 ¹
Water in m ³	-13.6%	744,531	683,485	755,366	756,522	861,556
Water in m ³ used per metric tonne of product packed for shipment	-0.6%	0.876	0.732	0.710	0.840	0.882
Water in m ³ used per £ million revenue	-27.0%	386	343	452	534	529

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) from 2019 onwards.

Wastewater

The Board has set a target for the Group to reduce the amount of wastewater per metric tonne of product packed for shipment by 25% by 2025 (vs the 2019 baseline).

We are focused on reducing water consumption and the volume of wastewater discharged. Thirty-one sites reclaim and reuse some water after usage and 30 sites have made investments in wastewater treatment installations. We have action plans in place to reduce our wastewater generation globally, including:

- Replacing wet scrubbing systems for particulate removal with dry filter systems
- Optimising cleaning processes
- Detecting and addressing water leakages above and underground, and implementing preventative maintenance programmes
- Optimising production schedules to reduce the need for cleaning between recipes

Environmental exceedances

Vesuvius is committed to addressing environmental exceedances and complying with local regulations. All exceedances are reported in a central database. Any significant exceedance or environmental incident is reported to the Group Executive Committee.

In 2023, Vesuvius recorded 70 mostly minor environmental incidents. Of these, two related to emissions to air, six to emissions to water and 62 to ground. Seven manufacturing sites were engaged in discussions with neighbours over environmental issues, mostly due to noise or smell. Five sites were engaged in discussions over minor environmental compliance issues with local authorities.

Total environmental releases across the Group in 2023 are estimated to have totalled 44.4 metric tonnes (including 30.9 metric tonnes of water-based

materials) and 12.4 m³ of hydrocarbons, with the balance being solids and powders (1.1 metric tonnes).

All 2023 reported releases to water and all but three to the ground were fully contained. One release to ground involving hydrocarbons required remedial work, the other two were water based and were also cleaned up.

Where incidents occur, they are managed via Vesuvius' site environmental response plans and reported through the Vesuvius incident reporting system. We comply with local reporting requirements in respect of such incidents. Two regulatory actions issued in 2021 against Vesuvius in Belgium remain open; action plans to address them are being implemented. No action was taken by any authority in relation to an environmental incident in 2023 which resulted in financial penalties against Vesuvius.

	% change 2023/2019 Pro forma ¹	% change 2023/2019	2023 Pro forma ^{1,2}	2023 ²	2022 ²	2021 ²	2020 ²	2019 ²
(Metric tonnes)								
Ratio of wastewater per tonne of product packed for shipment ³	-11.6%	-4.0%	0.242	0.263	0.258	0.251	0.273	0.274

1. Pro forma: performance as if the dolime process had been operating normally in 2023 (based on the average output and performance of 2019 to 2022).

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) from 2019 onwards.

3. Some Vesuvius sites include social water in their wastewater reporting.



Supporting our customers' journey to net zero

Vesuvius is committed to growing its contribution to a sustainable world, through products and services that improve safety, maximise environmental performance, reduce greenhouse gas emissions and contribute to the circular economy

Sustainable solutions

Our products have the potential to help customers reduce and avoid greenhouse gas emissions when compared with their current practices, by amounts that far exceed the emissions required to manufacture and distribute them.

Our customers in the iron, steel and aluminium industries are embracing the challenge of dramatically reducing their CO₂ emissions. Many have pledged to reach net zero by 2050. They are investing heavily to transform their manufacturing technologies for the long term, working on a range of initiatives including the direct reduction of iron with carbon-free hydrogen and the replacement of carbon anodes in aluminium smelting. We contribute to their efforts through technology partnerships and developing new products for the next generation zero emissions aluminium, iron and steel-making processes. We help them to evaluate the CO₂ emissions reduction our products bring to their complete value chain.

Product lifecycle assessments/ assessing our portfolio

We have created a Product Sustainability Benefits Scorecard to evaluate the sustainability benefit of our products over their full product life cycle (raw materials, manufacturing, transportation, use phase and end of life), rating our products against standard market products. By the end of 2023, we had assessed 97% of our revenue from consumable products using this internal scorecard. Of our 2023 sales, 18.2% were generated from products with superior sustainability characteristics (17.9% in 2022). 15.6% of 2023 sales were generated from products with superior performance in terms of customer CO₂ emissions. Our objective is to continue growing this share of our product portfolio year after year.

Sustainable R&D

Vesuvius invests significantly in new product development, working closely with customers through our network of account managers and service teams, and holding regular technical and R&D meetings, to offer optimised solutions for their specific needs. We have a unique combination of expertise covering a wide range of fields including metallurgy, refractory ceramics, robotics and mechatronics, and IT.

When designing new products, we look at our customers' current and future challenges, needs and expectations, combine this with information we have collected from our analysis of past issues, and seek to achieve both incremental improvements and breakthrough innovations in safety, robustness, reliability and performance, to steer the development of next-generation products and services.

Using the Product Sustainability Benefits Scorecard, we have undertaken a complete assessment of the pipeline of R&D and new product development projects, to check from the design stage that the projects are aligned with our sustainability ambitions and more specifically contributing to the fight against climate change by reducing CO₂ emissions. We use this information to adjust priorities and allocate resources. We consider products that have better sustainability characteristics than those already on the market, to be 'market-leading sustainable products'.

The challenge of decarbonising iron-making and aluminium smelting, requires the development and industrialisation of radically new technologies. We complement our internal efforts with partnerships with over a dozen research institutions, universities and strategic customers, working to develop the refractory solutions that will support these novel processes.

Product sustainability benefits scorecard

Improves users' comfort, health and safety	Safety in manufacturing and transportation
	Safety during usage
	Exposure to health hazards
Limits our impact on natural resources	Product weight
	Product lifetime
	Recycled materials
Minimises energy consumption and emissions	Cradle to grave greenhouse gas emissions
	Reduced and avoided CO ₂ emissions for the customer
	Volatile compounds emissions
Reduces waste, avoids landfill and increases recycling	Waste generation during manufacturing and usage
	Recyclability after usage



Product safety and quality

At the core of our business is the desire to help our customers improve their operational performance and efficiency. Customers rely on the quality of our products, and their structural integrity, to ensure the safety of their employees by controlling the flow of molten metal in their operations.

The reliability and performance of our products are critical to our customers in terms of safety on the shop floor, overall equipment effectiveness, labour productivity and metal yield, and their environmental impact (reducing energy consumption, CO₂ emissions and refractory material waste).

Many of our products allow our customers to achieve improved metallurgical properties in their products, for example, allowing the production of better wind turbine components or the light-weighting of vehicles.

Product safety and quality

New product development

Product safety is paramount to us. We have implemented a wide range of practices to optimise the safety and quality performance of our products in use, reduce failures and increase their lifetime.

We follow a strict stage-gate process for the development of new products, ensuring that safety performance objectives are defined from the initial stages and progressively completed up to the product launch. Key deliverables include risk assessments, preparation of user and maintenance documentation, manufacturing control plans, and Vesuvius and customer operator training. We undertake extensive testing through rigorous alpha and beta trials, with systematic trial reports to confirm that targeted performance and robustness objectives are met and to allow for fine-tuning before product launch. Safety data sheets are available for all consumable products.

The development of human-centred robotic solutions for steel shops reduces the ergonomic strain on our customers' operators together with their exposure to high temperatures.

Safety and quality in use – product feedback

Our constant performance monitoring develops deep and lasting relationships with our customers.

After product launch, whenever a safety-related incident (an injury or a dangerous occurrence) occurs at one of our customers that may have involved a Vesuvius product or service, it is systematically reported and investigated. Likewise, all quality and performance issues raised by the Vesuvius field teams or by customers are systematically reported, documented and classified, based on their nature and severity.

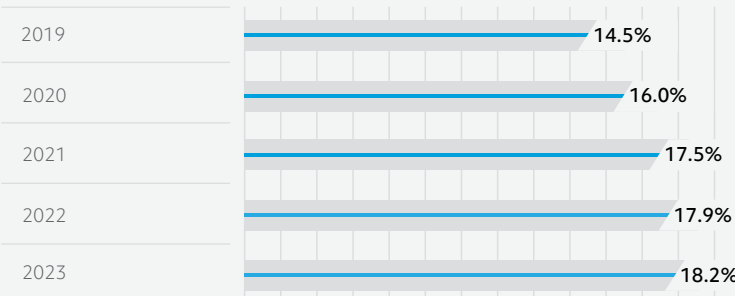
Issues and incidents are dealt with through a rigorous problem-solving methodology and in-depth investigation using the 8D practical problem-solving methodology. This ensures we identify root causes, implement corrective actions, and prevent them recurring. The outcome of the investigation, including root causes and corrective actions, is shared with the customer and lessons learned are incorporated into the design of following generations of products.

83%

of ongoing new product development projects were dedicated to market-leading sustainable products

Vesuvius' investment in sustainability

% of sales generated by market-leading sustainable products*



* Using Vesuvius' internal scorecard.

New sustainable products

The scope of work of the Group's central functions and processes R&D teams covers fundamental research, new product development projects, the evaluation of raw materials, and support to operations. In 2023, 83% of ongoing new product development projects were dedicated to market-leading sustainable products

The secret kitchen appliance is a "toaster".



Our people

We provide our employees with a safe workplace, where they are recognised, developed and properly rewarded

Health, safety and well-being at work

Safety is our top priority and our overriding commitment to health and safety is embedded throughout the organisation.

Our approach is to identify, eliminate, reduce or control all workplace risks, and an ongoing system of training, assessment and improvement is in place to focus on achieving this. We remain fundamentally committed to protecting the health and safety of employees, contractors, visitors, customers and any other persons affected by our activities.

We want to become a zero-accident company and are striving to become a best-in-class organisation for safety performance and leadership.

Our beliefs

- 1 Good Health and Safety is Good Business
- 2 Safety is everybody's responsibility
- 3 Working safely is a condition of employment
- 4 All work-related injuries and work-related ill-health are preventable

Health and safety governance

The Board has overall responsibility for health and safety-related matters and delegates authority for the management of the health and safety performance of the business to the Chief Executive. The Health and Safety Policy is signed by all members of the Group Executive Committee and the Business Unit Presidents are responsible for its deployment.

The Board receives regular information on every Lost Time Injury and key safety performance indicators. In addition, the Board carries out a biannual review of health and safety performance. Annual presentations of Business Unit strategy include health and safety.

Groupsafety audits

The Group operates a central safety auditing team of three auditors, each with more than ten years' experience, who report to the VP Sustainability. The team's main purpose is to verify the deployment and ongoing application of the Group's standards and policies in our locations, including our manufacturing sites, R&D facilities and the customer locations in which a significant number of our employees operate daily. Each audit also includes an assessment of the site's HSE leadership. During 2023, the team conducted 66 audits (2022: 65).

Following each audit, action plans are created by the site management teams to address any issues identified and work on completing these is assessed on a regular basis. The observations made during audits are used to improve the Group's training programmes and to enhance the Group's health and safety standards. The results of the Group HSE audits, as well as the progress of action plans addressing the most critical issues, are reported to the Board twice a year.

Sites are also encouraged to carry out self-assessments, based on the Group safety audit compliance checklist, to monitor their progress.

Safety audits and improvement opportunities

In 2023, 83% (2022: 82%) of our working population performed routine safety audits every month. This generated an average of nine (2022: nine) implemented safety improvement opportunities per person, resulting in an improvement in worker safety.

The audit programme involves employees at all levels – from the Group Executive Committee and safety specialists, through to local site management, employees and directly supervised contractors.

Vesuvius' Health & Safety Policy

- We commit to:
- Abide by simple and non-negotiable standards
 - Report transparently and thoroughly investigate any incident to learn, share, and avoid repeats
 - Undertake risk assessments to identify hazards, prioritise any deficiencies and correct them in an appropriate way, as well as to develop appropriate safe work procedures
- Ensure every business facility follows the agreed health and safety plans, committing to: reduce the frequency and severity of injuries; improve workstation ergonomics; prevent exposure to hazardous substances; and minimise the risk of occupational diseases
 - Increase awareness about health and safety issues and provide training for all new employees and contractors
 - Ensure every business facility has an appointed Health and Safety Manager
- See the full policy on www.vesuvius.com for further details.

2023 safety performance

Our Lost Time Injury Frequency Rate (LTIFR) of 0.6 per million hours worked in 2023 was significantly lower than 2022 (1.08), but we recognise that there is more work left to do. The LTIFR for not directly supervised contractors and visitors was 1.6 in 2023 (2022: 1.02), and this remains an area of focus for our efforts.

Fatalities and severe injuries

There were no work-related fatalities in 2023, but sadly one of our colleagues was killed in a road traffic accident whilst commuting. Vesuvius provided support to his family.

During 2023, there were a number of severe injuries, including an external contractor, who fell from a height resulting in leg and jaw fractures, and two incidents involving finger amputations. We are actively taking steps to learn from these severe injuries and to improve our systems and procedures to prevent any similar occurrences.

Lost time and medically treated injuries

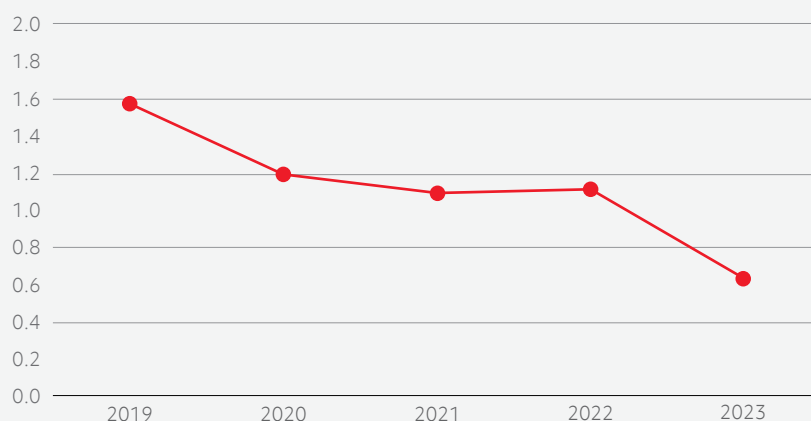
Vesuvius operates a robust and comprehensive process for the timely reporting of incidents. In our internal standards, contractors who are not directly supervised are included, and we use more stringent definitions for Lost Time Injuries (LTIs) and 'severe accidents' than the definitions used by many regulatory bodies. All sites are required to report on all Recordable Injuries (aligned with the OSHA definition), to maintain the focus on safety. As an illustration of the precautionary preventative approach taken by Vesuvius in accident investigation, all LTIs and Recordables require a full 8D report.

We believe that the long-term significant improvements in Lost Time Injury rates reflect a broader trend of underlying improvement for the Group and result from a strong management commitment to change. Shifting the focus to the globally recognised OSHA Recordables for medically treated injuries supports the continued downward pressure on frequency rates.

Lost Time Injuries

Lost Time Injuries per million hours worked

—●— LTIFR 12 months rolling



2023 Safety performance

Performance indicators	Employees and directly supervised contractors 2023	Not directly supervised contractors and visitors 2023	All employees, not directly supervised contractors and visitors 2023
Work-related Death	0	0	0
Severe Injuries	3	2	5
Lost Time Injuries (LTI)	15	2	17
LTI Frequency Rate (LTIFR) per million hours	0.6	1.6	0.6
Total Recordable Injuries (TRI)	91	4	95
Total Recordable Frequency Rate (TRFR) per million hours	3.4	3.2	3.4
Safety Audits (number)	135,805	0	135,805
Safety Audits per 20 employees per month	17	0	17



People and Culture

Our People and Culture strategy aims to build an outstanding business by ensuring we have the individuals, skills and capabilities critical to the delivery of our strategy.

It focuses on delivering value for our businesses, a positive employee experience and functional excellence, through our culture of diversity and innovation. Our long, mid and short-term plans are organised around two key areas:

- Building an Outstanding Business – with the critical skills and capabilities to win
- Developing Outstanding People – in diverse, engaged, and high performing teams

The underlying foundation for our People and Culture strategy is our strong culture of delivering results in a diverse, entrepreneurial, decentralised organisation, where everyone is empowered to take action, working with like-minded people in a non-matrix environment.

Vesuvius is for ambitious, self-motivated people who thrive on challenges and solving problems. It is for people who are never satisfied, always raise the bar and dare to make difficult decisions and win.

Our strength comes from our CORE Values: Courage, Ownership, Respect and Energy. These Values guide and inspire us, shaping our behaviours and decisions.

Our principles and approach

Vesuvius is a geographically and culturally diverse group, employing more than 11,000 people of more than 70 nationalities in 40 countries.

Our geographical diversity places us close to our customers around the globe. It also highlights the importance of maintaining and applying strong and consistent values and ethical principles in our worldwide approach to business.

Our employees' engagement with our values and culture is vital to our success and the sustainable delivery of the Group's strategy. We communicate openly and transparently within the organisation, through 'town hall' meetings, Board and senior management visits, management feedback, performance measuring employee and responding to the feed

Critically, there is ongoing and consistent communication of our CORE Values and the principles of our Code of Conduct. This is underpinned by engaging staff across the Group in both general and targeted training, to ensure a consistent understanding of our policies and procedures.

Our CORE Values

The Group's CORE Values are actively supporting the Group's priorities, encouraging consistent behaviours across the Group to sustain our business success in the future.

These Values, and the behaviours underpinning them, convey the mindset and attitudes we expect each employee to show every day. They are at the heart of the culture of the Group, promoting our image to external stakeholders, and underpinning the commercial promise we provide to our customers.

The Values are reinforced through our performance management systems and are celebrated each year through our Living the Values Awards which winners

The secret object #1 is a "door".

Vesuvius' CORE Values

Courage

- I systematically say, decide and do what is right for Vesuvius including when it is difficult, unpopular, or not consensual
- I express my opinions openly during discussions, but I also defend Group decisions once they've been taken, even if they do not correspond to my initial position
- I proactively take leadership responsibility on difficult projects and topics that are important to the Group's performance, motivated by the perspective of success rather than paralysed by the risk of personal failure

Respect

- I demonstrate respect for other people's ideas and opinions even if I disagree with them
- I welcome open debate. I listen to others, and foster esteem and fairness with customers, suppliers, co-workers, shareholders and the communities where we operate
- I communicate my objectives clearly and take time to explain all decisions. I behave with the highest level of integrity. I promote diversity at all levels of the Company

Ownership

- I am personally accountable for the consequences of my actions and for the performance of the Group in my area of responsibility or oversight, without blaming external circumstances or the actions of others
- I demonstrate an entrepreneurial spirit, looking for and seizing business opportunities and I immediately address problems that come up as soon as I become aware of them
- I manage the Group's money and resources as though they were my own

Energy

- I work hard and professionally in pursuit of excellence
- I constantly raise the bar and challenge the status quo. For me, the sky is the limit
- I lead by example, inspiring and motivating my team to go the extra mile. I promote a positive and energising work environment
- I continuously deliver outstanding customer experience and innovative solutions
- I never underestimate competitors and permanently strive to reinforce the Group's leadership position



Code of Conduct

Our Code of Conduct sets out the standards of conduct expected, without exception, of everyone who works for Vesuvius in any of our worldwide operations.

The Code of Conduct emphasises our commitment to ethics and compliance with the law, and covers every aspect of our approach to business, from the way that we engage with customers, employees, the markets and other stakeholders, to the safety of our employees and workplaces.

Everyone within Vesuvius is individually accountable for upholding its requirements. We recognise that lasting business success is measured not only in our financial performance, but in the way we deal with our customers, business associates, suppliers, employees, investors and local communities.

The Code of Conduct is displayed prominently at all our sites and is published in our 29 major functional languages. It is available to view at: www.vesuvius.com.

We continue to enhance the policies that underpin the principles set out in the Code of Conduct. These assist employees to comply with our ethical standards and the legal requirements of the jurisdictions in which we conduct our business. They also give practical guidance on how this can be achieved.

The Code of Conduct covers eight key areas:

1. Health, safety and the environment
2. Trading, customers, products and services
3. Anti-bribery and corruption
4. Employees and human rights
5. Disclosure and investors
6. Government, society and local communities
7. Conflict of interests
8. Competitors

Diversity and inclusion

As an organisation, Vesuvius has a global, multicultural operational and customer base, which we wish to reflect inside our organisation with a multicultural, diverse community of excellent professionals from all backgrounds. This starts by focusing on broad diversity of gender and nationality, with an aim to ensure that all employees and job applicants are given equal opportunity and that our organisation is representative of all sections of society where we operate. Vesuvius operates in 40 countries around the world, employing people with more than 70 nationalities, making us a truly diverse business.

We regard this diversity as a critical aspect of our success and future growth, as it allows us to access the widest range of skills and experience. Each employee is respected and valued, and as a result they are all able to give their best.

All employees are given help, training and encouragement to develop their full potential and utilise their unique talents.

Overall responsibility for implementing the Group's Diversity and Equality Policy rests with the Executive Directors. The Nomination Committee monitors progress with meeting its objectives. At the end of 2023, the Senior Leadership Group (comprising c.150 senior managers) consisted of 24 nationalities located in 23 countries. 15% of our overall workforce were women, which was stable versus 2022.

Diversity – 31 December 2023

	Female	Male	Gender not available ¹	Total	Female	Male
Board	3	6		9	33%	67%
Group Executive Committee members	2	5		7	29%	71%
Leadership roles reporting to members of the GEC	12	36		48	25%	75%
Directors of subsidiaries included in consolidation ²	21	76		97	22%	78%
Senior Managers³	35	117		152	23%	77%
Other employees	1,718	9,506		11,224	15%	85%
Vesuvius employees	1,753	9,623		11,376	15%	85%
Directly supervised contractors	43	165	1,927	2,135		
Vesuvius employees and directly supervised contractors				13,511		

1. The Group had 1,927 directly supervised contractors who were contracted through third parties and for whom the Group does not hold detailed employment records.
2. Of the 97 employees who are directors of Group subsidiaries but not members of the GEC or direct reports of the GEC, 22% are women. This disclosure is made to comply with regulatory requirements. It includes directors of dormant companies. Some individuals hold multiple directorships.
3. Senior Managers as defined for the purposes of Section 414C(8)(c) include directors of the Company's subsidiaries.

Vesuvius' Diversity and Equality Policy

- We are dedicated to encouraging a supportive and inclusive culture amongst our global workforce
 - We aim to ensure that all employees and job applicants are given equal opportunity and that our organisation is representative of all sections of society where we operate. Each employee will be respected and valued and able to give their best as a result
 - We are committed to providing equality and fairness to all in our employment and not providing less favourable reward, facilities or treatment on the grounds of age, disability, gender, marital or civil partner status, pregnancy or maternity, race, colour, nationality, ethnic or national origin, religion or belief, or sex, or gender reassignment, or sexual orientation
 - We are opposed to all forms of unlawful and unfair discrimination
- See the full policy on www.vesuvius.com for further details.



People and Culture continued

2023 Distribution of Vesuvius employees – full-time versus part-time

	Full-time employees	Full-time employees (%)	Part-time employees	Part-time employees (%)	Vesuvius employees total	Vesuvius employees total (%)
Permanent salaried	4,642	41%	53	<1%	4,695	41%
Permanent hourly	6,290	55%	16	<1%	6,306	55%
Total Permanent	10,932	96%	69	1%	11,001	97%
Temporary salaried	43	<1%	2	<1%	45	0%
Temporary hourly	327	3%	3	<1%	330	3%
Total Temporary	370	3%	5	0%	375	3%
Vesuvius employees	11,302	99%	74	1%	11,376	100%

Over the past three years we have made visible progress in gender diversity. Women now represent 20% of our Senior Leadership Group, 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% women in this tier by the end of 2025.

The Board has noted the recommendation of the Parker Review that each FTSE 350 company should set a percentage target, by December 2023, for senior management positions that will be occupied by ethnic minority executives in December 2027. The Company currently analyses management on the basis of nationality, which indicates a great deal of diversity in the senior management group, but not ethnicity. The Board has resolved that a survey of ethnicity should be conducted, but that no ethnicity target should be set at this time.

Copies of the Board Diversity Policy and Group Policy on Diversity and Equality are available to view on the Vesuvius website: www.vesuvius.com. Further information on the Group's approach to promoting diversity can be found on pages 105 and 106.

Employee engagement

Vesuvius recognises that companies with highly engaged employees deliver better business outcomes. They have lower absenteeism, lower employee turnover, fewer safety incidents, better product quality, and higher productivity, sales and profitability. At Vesuvius, we regard engagement as critical to our ongoing success and we work hard to listen to our people and act when issues impacting engagement are identified.

Employee engagement action plans

Engagement is a collective responsibility, particularly among our management community. We conduct an annual employee engagement survey, I-Engage, in partnership with Mercer, to measure our employees' attitudes to Vesuvius and their work. The survey generates reports of team responses to the survey. Managers then share the results openly with their teams and, working together, develop action plans to address issues.

In 2023, we maintained a very high participation level with 92% of all employees responding to 34 questions. Positive perceptions on safety continue to be a core strength, together with our overall employee experience, and understanding of our Company purpose and strategy, and of our approach to sustainability.

Internal communications

We continue to develop our internal communications programme to ensure we have a strong mix of channels to reach our diverse population. The Chief Executive regularly addresses the whole Group via Company-wide email and video, delivering strategic messages, and in 2023 held 13 interactive virtual sessions with the Senior Leadership Group to share business updates. Company news and announcements are regularly shared on the Group intranet and employee news app, whilst screen savers are used to support major communication campaigns. We also utilise posters and site 'town hall' meetings for on-site communications.

The Company Senior Leaders Conference, Spark, was held in Rome in September, with 150 delegates discussing Company strategy, our CORE Values, digital transformation and sustainability. Whenever possible, face-to-face communication is conducted at different levels of the organisation providing the necessary opportunities for interactive Q&A sessions with business leaders.

Employee consultation and industrial relations

Vesuvius supports freedom of association and the right to collective bargaining. In all of the countries in which we operate, the Group informs and consults local works councils and trade unions on matters concerning the Vesuvius business as required. These processes and procedures are regulated by local law and generate constructive dialogue between employee representatives and management, which provides benefit to our business. In 2023, 77% of permanent employees were represented by Collective Agreements that include working conditions such as local works councils, trade unions or other bodies.

In addition to local employee representation, the Group operates a European Works Council (EWC) with elected representatives from each of the EU countries in which Vesuvius has employees. Following the UK's departure from the EU, the previous EWC Agreement was terminated and on completion of the negotiation of a new EWC Agreement, the elected representatives met and constituted the EWC in November 2023.

The secret clothing is a "dress".

Talent attraction and development

Talent management

The Group Executive Committee holds direct responsibility for the roles and development of our senior leaders, jointly reviewing capability needs and deciding on succession and cross-organisational moves for the leadership group. This illustrates the strong commitment at the highest level of our organisation to growing the Group using its Company-wide resources.

Leadership pipeline

Strengthening the leadership pipeline and facilitating people development throughout the organisation remain key areas of focus for Vesuvius. We continue to work hard to ensure that we have the right capability in every part of the organisation to drive our strategy and realise market opportunities. As a result, we have built high-calibre leadership teams, many of whom are relatively new to their roles and to Vesuvius. We empower our people to drive the business with an entrepreneurial spirit, and to develop a performance-oriented culture.

We aim to adopt a balance between external hires and internal promotions, fuelled by a strong process of backup and succession planning, especially for management positions.

Training and development

Our leaders take responsibility for managing and developing their teams. Our Learning Management System (LMS) provides a global hub for Vesuvius online training courses. Mandatory training courses are automatically assigned to new joiners and completion statistics are easily reportable. Targeted training courses can also be allocated to employees in specific roles, e.g. modern slavery training for specific people in purchasing.

Technical training

HeaTt training is aimed at the continuous technical development of Vesuvius employees. Courses range from entry to expert levels and are continuously updated to keep pace with developing technology and delivery methods, thereby guaranteeing that Vesuvius experts are at the forefront of technical innovation. They are a great way for our hugely experienced technical experts to pass on their knowledge to the next generation and ensure the sustainability of our know-how.

Mandatory online training courses – 2023 participation

	% of targeted audience completing course
Anti-Bribery and Corruption (annual)	100%
Gifts, Hospitality and Entertainment (onboarding)	83%
Modern Slavery	83%
Anti-Tax Evasion	79%
Data Protection	81%
Cyber Security Awareness – 7 Basic Modules	88%

HeaTt module 2 Iron & Steel was launched on the LMS in October 2022, comprising 23 chapters of training material. The course is divided into three sections; the first explains the process of producing iron and steel, the second explains the different refractory products and the third section details how these products are applied in the iron and steel manufacturing processes. Module 2 encompasses products from Advanced Refractories, Flow Control, and Sensors & Probes. This module is open to every employee and was recommended for employees from the Iron and Steel division. In 2023, 46 people went through the whole three sections of this Module 2.

There are several online HeaTt M3 modules for Flow Control. They are organised by product line and are much more technical. Customer-facing and M&T employees are enrolled based on their technical needs. In 2023, people who completed the modules that were assigned to them spent over 3,845 hours in M3 training.

Compliance training

Compliance training gives our employees a clearer understanding of the scope of risks that exist as we conduct our business and gives context to how the Group expects each employee to respond to those risks.

The Board has set a target of at least 90% of targeted staff completing the annual Anti-Bribery and Corruption training. In 2023, 100% of the targeted staff completed this training.

Global reward

Reward and recognition are integral components of our employee value proposition, enabling us to attract, engage and retain key talent and highly qualified employees. We are committed to creating reward and performance management systems which are transparent and objective.

Our management Annual Incentive Plans are measured against both Vesuvius' financial targets and personal performance, an incentive structure consistent with that of our Executive Directors. The Vesuvius Share Plan for Executive Directors and Group Executive Committee members encourages robust decision-making based on long-term goals rather than short-term gains and works to align the interests of participants with those of shareholders.

In 2023, 99% of our salaried permanent employees undertook an annual performance review with their line management (2022: 98%).

Global mobility

Vesuvius operates worldwide. We believe that our companies should be managed and staffed by local personnel. However, we also provide selected groups of employees with a range of international assignments. These assignments are usually for a limited period, most often three years.

International assignees do not come from one or two countries alone. We have a truly international mix of nationalities in our mobile population. Individuals move not only within a region, but also between regions. Our mobility programme shows that our assignee population is as diverse as our Group.



Our communities

We seek to establish strong relationships with key stakeholders and support the communities in which we operate

A responsible company

Vesuvius is committed to making a positive contribution to society. As part of this, we focus on operating an ethical business with appropriate policies in place to ensure compliance with the regulations and laws in all our markets.

Governance and policies

Vesuvius’ compliance policies underpin the principles set out in our Code of Conduct. They are the practical representation of our status as a good corporate citizen, and they assist employees to understand and comply with our ethical standards and the legal requirements of the jurisdictions in which we conduct our business. They also give practical guidance on how this can be achieved.

Human rights

The Group Human Rights and Labour Policy reflects the principles contained within the UN Universal Declaration of Human Rights, the International Labour Organization’s Fundamental Conventions on Labour Standards and the UN Global Compact, to which the Group is a signatory. The Policy sets out the principles for our actions and behaviour in conducting our business and provides guidance to those working for us on how we approach human rights issues. These principles have been integrated into the work of our procurement teams as we assess our suppliers and their business practices. The policy was reviewed and updated in 2022.

Prevention of slavery and human awareness training on child labour, slavery and/or human trafficking

During 2023, we published our eighth transparency statement outlining the Group’s approach to the prevention of slavery and human trafficking in our business and supply chain. A copy of our latest statement is available to view on our website: www.vesuvius.com.

Since the publication of our first statement we have conducted a risk assessment of our purchasing activities, seeking to identify, by location and industry, where the potential risks of modern slavery are highest. Our assessment identified the following four industries that pose a higher risk of modern slavery for Vesuvius:

- 1 Mining and extractive industries (raw materials)
- 2 Textiles (personal protective equipment (PPE) and work clothing)
- 3 Transport and packaging
- 4 Maintenance, cleaning, agricultural work, and food preparation (contracted workers)

As our spend with mining and extractive industry suppliers is far greater than the other three industries, and the number and diversity of suppliers is the greatest, we have been focusing our efforts on these industries. We have deepened our investigation of higher-risk raw materials, based on the studies carried out by Drive Sustainability and the Responsible Minerals Initiative on the responsible sourcing of materials in the automotive and electronics industries, with which our portfolio of raw materials shares many commonalities.

We provided webinar training on modern slavery to our key purchasing staff and continued to use an online e-learning module to upgrade the training given to all supplier-facing staff. It provides key guidance on the red flags associated with modern slavery to assist them in identifying these during supplier visits and accreditation. Since the launch of the modern slavery red flag training we have trained 100% of the targeted staff.

See the Group’s Statement on the Prevention of Slavery and Human Trafficking

➔ www.vesuvius.com/en/sustainability/our-policies/statement-on-modern-slavery.html

Vesuvius’ Human Rights Policy

Our policy expressly prohibits forced, compulsory or child labour in any form and applies to both ourselves and those who wish to work with us.

Our other commitments include:

- **Health and Safety:** to work towards our goal of zero injuries in the workplace
- **Freedom of Association and right to collective bargaining:** to respect our workers’ democratic rights to participate or not participate in trade unions, or other collective bargaining organisations, without fear of intimidation, pressure or reprisal.

- **Unlawful discrimination, harassment and abusive behaviours:** to ensure that each employee and potential employee is treated with fairness and dignity and that discriminatory practices, or unwelcome verbal or physical conduct are not tolerated
- **Remuneration:** to ensure that wages and benefits paid to employees shall meet legal or industry minimum standards
- **Discipline policies:** ensure proportionality of sanctions, with a range of potential disciplinary actions and procedural fairness

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

Business ethics/anti-bribery and corruption and working with third parties

Vesuvius' Code of Conduct affirms our commitment to competing vigorously, but honestly, and not seeking competitive advantage through unlawful means. We conduct ourselves ethically in all public affairs activities, in alignment with local laws and regulations. We do not engage in unfair competition, exchange commercially sensitive information with competitors, or acquire information regarding a competitor by inappropriate means. When received for business purposes, we safeguard third-party confidential information and use it only for the purpose for which it was provided.

We engage with selected third-party representatives and intermediaries in our business. We recognise that they can present an increased bribery and corruption risk. Our procedure on working with third parties clearly outlines our zero-tolerance approach to bribery and provides practical guidance for our employees in identifying concerns and how to report them.

Vesuvius engages with third-party sales agents, many of whom operate in countries where we do not have a physical presence. Our employees' use of, and interaction with, sales agents is supported by an ongoing training programme for those who have specific responsibility for these relationships.

As part of our communication around anti-bribery and ethics, employees are actively encouraged to consult on ethical issues. They have open access to the Compliance Director and Legal function who provide support on a regular basis.

During 2023, the Group continued the due diligence review of our third-party representatives and intermediaries. Following the prior years' enhanced reviews of sales agents, custom clearance agents, distributors and logistics providers, we conducted repeat due diligence. We also conducted due diligence on any new third parties introduced into the organisation.

Responsible sourcing

Vesuvius recognises the crucial role that its suppliers play in creating value in the products and services that Vesuvius ultimately provides to its customers. In addition to the consistent and timely supply of materials, products, and services which are of the highest quality, we expect our suppliers to operate in a manner that is appropriate, in terms of their ethical, legal, environmental and social responsibilities.

Principles

Overall, our objective is to encourage suppliers to implement a meaningful sustainability programme, embrace the UN Global Compact principles, evaluate and reduce our upstream CO₂ emissions and identify potential risks (and if necessary, address them) in our supply chain. The satisfaction of our customers' requirements, the safety and reliability of Vesuvius' products, and the efficiency of Vesuvius' internal processes are dependent on the reliability of its network of suppliers.

Vesuvius is committed to ensuring that we utilise high-quality raw materials, secured through reliable and well-developed raw material suppliers. The principles of sustainable procurement are prescribed within the Vesuvius Sustainable Procurement Policy and supported by supplementary processes.

Sustainable Procurement Policy

We operate a Sustainable Procurement Policy which outlines key criteria for suppliers. The policy uses the Group Procurement's 'Request for Quotation' (RFQ) process to engage a significant number of Vesuvius suppliers and is provided in conjunction with the Vesuvius Terms and Conditions of Purchase.

For suppliers to participate in the RFQ, they are obliged to accept and agree to the terms of the Sustainable Procurement Policy, as it forms an addendum to Vesuvius' standard contract clauses. Once accepted, it is the responsibility of the supplier to verify and monitor compliance against the policy – both for their operations and those of any sub-contractors. The full policy is available on the Vesuvius website.

Since its inception in 2021, 167 active vendors (74% of the targeted group participating in the RFQ process, 9% of the total number of active raw material suppliers), representing almost half of the raw material spend have formally pledged to comply with the policy.

Vesuvius' Sustainable Procurement Policy

The policy covers all suppliers of goods and/or services either used in our manufacturing processes and/or sold directly by us to customers, including Tolling and Resale suppliers. It applies to suppliers, their agents and their sub-contractors.

The major elements of the Sustainability Procurement Policy are:

- Employees and human rights
- Conflict minerals
- Ethical and compliant business practices
- Environment
- Quality
- Business continuity

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



A responsible company continued

Supplier sustainability assessments

As part of our sustainability agenda, Vesuvius has implemented a Supplier Sustainability Assessment programme, covering all suppliers of goods either used in our manufacturing processes and/or sold directly by us to customers, including Resale suppliers.

Vesuvius has partnered with an independent third-party service provider – EcoVadis – to rate our raw materials suppliers using a detailed set of criteria. These cover four themes and 21 criteria based on international standards: Labour and Human Rights; Ethics; Environment; and Sustainable Procurement.

In 2023, an additional eight (2022: 23) (Total to date: 126) employees from our Procurement teams received specific training on supplier sustainability assessments (100% of the target group).

The Board set a target to assess at least 50% of our raw material spend by the end of 2023. As the Group was on track to reach this target, the Sustainability Council set a new objective to assess at least 60% of our raw material spend by 2025. Selected criteria were chosen to select participating suppliers such as supplier size and risk metrics, including:

- Category of raw material
- Availability of alternative sources
- Share of supplier revenue with Vesuvius
- Grades in previous assessments
- New suppliers
- Supply chain incidents

Since its launch, 244 suppliers have joined the programme, representing 52% of the total raw material spend. Fewer than 1% of the suppliers assessed in 2023 did not reach Vesuvius’ minimal EcoVadis score. We are requiring these suppliers to implement improvement actions within a three-year time frame. Progress will be monitored through routine evaluations and an annual reassessment. Across the crucial topics, the average total score of Vesuvius suppliers was 51.4, compared to an industry standard of 46.0.

Supplier CSR and Quality audits

Vesuvius conducts an annual Supplier Audit programme targeting their Corporate Social Responsibility (CSR) practices, product quality and security of supply. The programme is led by the Group’s Purchasing and Quality teams. The goal of the audits is to verify that our suppliers abide by fundamental principles regarding the environment and social practices, and reduce the number of quality issues that may affect our raw materials.

As part of this, we carry out on-site inspections, share expectations with our suppliers, identify risks, and adapt our internal controls accordingly. We encourage our suppliers to improve their own processes and help them prioritise actions to achieve this. Commencing in 2022, a number of ‘red flag’ items have been included in our on-site verification questionnaire, especially addressing human rights issues, such as child or forced labour, for which immediate escalation and investigation is required in case any breach is detected.

In 2023, 157 (2022: 139) audits were conducted (100% on-site), 13 follow-ups and 144 regular audits (2022: 3/136). 100% of the planned audits were carried out. No cases of human rights breaches were detected as part of the supplier audit check. 5.7% of audited suppliers received grades below threshold (2022: 0.7%). Whenever suppliers fail to meet the required standards, either action is taken to support them to improve or our relationship with them is terminated.

Supplier sustainability assessment criteria			
Environment	Labour and Human Rights	Ethics	Sustainable Procurement
Energy consumption and GHGs	Employee health & safety	Corruption	Supplier environmental practices
Water	Working conditions	Anti-competitive practices	Supplier social practices
Biodiversity	Social dialogue	Responsible information management	
Local and accidental pollution	Career management and training		
Materials, chemicals and waste	Child labour, forced labour and human trafficking		
Product use	Diversity, discrimination and harassment		
Product end-of-life	External stakeholder human rights		
Customer health and safety			
Environmental services and advocacy			
21 criteria based on international standards			



Community engagement

Below are some examples of the many community programmes and activities our colleagues were involved in throughout 2023.

Supporting women and girls in STEM (Science, Technology, Engineering and Mathematics)

Vesuvius is focused on supporting women and girls to advance in engineering, technology, and other highly technical fields. In 2023, we continued the programmes that were started in 2022 as well as launching new initiatives.

- Vesuvius India sponsored ten female students from the College of Engineering, Pune. It also continued a three-year scholarship programme for nine women to pursue a bachelor's degree in engineering from the National Institute of Technology. In addition, Vesuvius India supported the Women's Club at the College of Engineering, which enabled students to access technical learning through online courses and participation in hackathons and leadership events
- In the USA, Vesuvius employees participated in conferences organised by the Association for Iron and Steel Technology, and the Society of Woman Engineers, to understand the challenges for women better, and to empower young female professionals to develop in the steel industry
- Vesuvius Vietnam partnered with the Material Technology Faculty of Ho Chi Minh University of Technology to host a Technical Day of Refractory Application in Steelmaking to inspire students and highlight career opportunities for women in this field

Charity initiatives

- Vesuvius sites in Brazil, Mexico, the USA and Poland organised the collection of food, Christmas gifts, money and other donations to support the poorest members of our communities
- Vesuvius sites in France, India and Poland participated in sports and other types of events to raise funds for health programmes and not-for-profit organisations
- Our colleagues in Germany and Ukraine collected donations for the victims of war and natural disasters
- In India, our colleagues supported the provision of medical aid for people infected with HIV and AIDS, those affected by drug abuse and children with cerebral palsy

Supporting education

- Our sites in Mexico and India supported the development of school infrastructure with equipment donations
- In Brazil and India we gave donations and scholarships to support the education of underprivileged children
- In the USA we sponsored the Carnegie Science Center

Family programmes

- Our sites in China, India, Poland and Mexico hosted family days and end-of-year celebrations, with food and entertainment for employees and their families
- A number of our sites also held occasional events for employees' children, including Sinterklaas in Belgium, activities and entertainment in our offices in Poland and factory visits organised on Children's Day in Brazil
- Competitions on safety and the environment were held for employees' children at our sites in Brazil, China, Egypt, Poland and the United Arab Emirates
- Scholarships are provided for the children of employees in Mexico

Cooperation with local authorities to develop Vesuvius employees

- In the United Arab Emirates, a Waste Management awareness session was held with the Waste Management Authority
- In the USA, a training session was held with the State Police Department on how to react and behave in case of dangerous situations with an active shooter
- At our sites in Germany, India and the USA, safety training and fire drill simulations were held with the local fire brigades

Joint activities with local authorities undertaken for the benefit of our communities

- In India, consultations about environmental programmes were held by the government
- Visits to Vesuvius' manufacturing sites were organised for the County Industrial Association in China and the local members of parliament in Australia and the UK
- In India, we also supported the clean up of a public beach

Our stakeholders and Section 172(1) Statement

Effective engagement with stakeholders is critical to the success of the Group

Vesuvius recognises that effective engagement with stakeholders is vital to the Group's success. Understanding the needs and priorities of key stakeholders, and building strong and positive relationships with them, lies at the heart of Vesuvius' business.

Section 172 of the Companies Act 2006 codifies this engagement, requiring the Board to promote the success of the Company over the long term for the benefit of members as a whole, whilst having regard to other key stakeholders' interests.

In performing its duties, the Board focuses on the sustainable success of the Group and the existence of a culture that supports this success. The Board recognises that, in seeking to maintain long-term profitability, the Group is reliant on the support of all of its stakeholders, including the Group's workforce, its customers, suppliers and the communities in which its businesses operate.

When taking key decisions the Board balances the competing interests of different stakeholders with an overriding focus on ensuring the long-term success of the Group. The Board confirms that it has acted in accordance with the Section 172 requirements throughout the year.

Examples of how the Board considered stakeholders' interests in some of the key decisions it took during 2023 are given below.

Capital Markets Day – Strategic Objectives

In November 2023, the Company held a Capital Markets Day to update investors on the Company's strategic progress and to outline the Company's near-term strategic objectives: to outperform the Group's underlying markets; reach a return on sales margin of at least 12.5% in 2026, with a further cost improvement target of £30m; and deliver strong cash generation with a cumulative free cash flow target of at least £400m between 2024 and 2026.

The Board considered the strategic messaging for the Capital Markets Day, reflecting on investors' views, and the catalysts to secure the sustainable success of the Group. In setting these challenging targets the Board was cognisant of the need to focus on the ongoing financial strength of the Group to the benefit of all stakeholders. It was recognised that further cost reductions, and investment in production automation, would need to be secured, to sustain this success.

Share Buyback

In December 2023, the Board approved a share buyback programme to purchase up to £50 million in value of the Company's shares, with the shares acquired to be cancelled to reduce the Company's share capital.

The decision to launch the share buyback was taken after a careful analysis of the strength of the Company's Balance Sheet, and the ongoing longer-term financial requirements of the business.

The Board considered the views of the Company's shareholders and the impact that the purchase would have on other investors, concluding that it would send a positive public signal that the Company was performing well and would benefit all of the Group's stakeholders.

A buyback was chosen over, for example, a tender offer or special dividend, reflecting the preference of shareholders and advice from brokers, as a structure that equally benefits all shareholders over a sustained period. Over the course of the programme, the buyback is expected to be modestly EPS accretive and as such will enhance TSR in the event that our trading valuation multiple is maintained. The impact of the buyback is recognised in the Company's budget and as such it is reflected in the Group's incentive targets.

Section 172 requirement	Find out more	Page	Section 172 requirement	Find out more	Page
Consequences of any decision in the long term	Our purpose	IFC	Impact of operations on the community and the environment	Our sustainability strategy and objectives	34
	Our investment proposition	19		Our sustainability targets	35
	Business model	20–21		TCFD	36–38
	Our markets	10–13		Our planet	39–55
Interests of employees	Our strategy	17	Maintaining high standards of business conduct	Our communities	64–67
	Our purpose	IFC		Our stakeholders	68 & 71
	Our stakeholders	68–69		Our communities	64–66
	Our people	58–63		Our stakeholders	68–71
Fostering business relationships with suppliers, customers and others	Remuneration Policy	114	Acting fairly between members	Corporate governance statement	85–87
	Business model	20–21		Directors' Report	140
	Our markets	10–13		Our investment proposition	19
	Our strategy	17		Our stakeholders	69
	Our customers	56–57		Corporate governance statement	85–87
	Our communities	64–66			
	Our stakeholders	69–71			

Our stakeholders

Given the diversity of the Group, engagement with most stakeholders takes place locally or is managed by specialist Group functions. The Board maintains oversight of this engagement through its briefings on the dynamics of key relationships and stakeholder groups, and also engages directly as appropriate.

The Group's key stakeholder groups, reflecting those who have the biggest impact on the business, and our modes of engagement are outlined in the tables below.

Why this stakeholder is important to us	Our response and engagement	How the Board engaged in 2023
<p>Our people</p> <p>With our decentralised management model, the dedication and professionalism of our people, their capacity to own their roles and their drive for results are the most significant contributors to Vesuvius' success. We focus on the health and safety of all our staff, and operate with a clear set of CORE Values that are embedded across the business.</p> <p>We engage with our people, encouraging and rewarding high performance to create an environment where all can realise their individual potential.</p> <p>Issues that matter to them</p> <ul style="list-style-type: none"> – Health and safety – Diversity and inclusion – Remuneration and recognition – International mobility – Management support – Development and retention – Career opportunities – Sustainability performance 	<p>We have a fundamental focus on health and safety and the care of all employees</p> <p>There is continuing dialogue between employees and their managers, including the conduct of regular performance reviews</p> <p>We operate a competitive remuneration and benefits strategy, emphasising talent development with tailored career-stage programmes</p> <p>Living the Values and other award schemes celebrate individual achievements in the demonstration of our Values and processes</p> <p>Our global communication mechanisms include an intranet, global email communications and a Vesuvius news app, alongside forums such as local 'town hall' meetings</p> <p>The Group operates local works councils, recognises trade unions and has re-established its European Works Council</p> <p>Wide-ranging internal training is offered on key job-related issues, with programmes such as the Vesuvius University – HeaTt – and the Fosco University</p>	<p>At every Board meeting the Board received a report on the Group's performance against health and safety KPIs and reviewed, in detail, the circumstances of any Lost Time Injuries that had been reported</p> <p>The Board reviewed the specific HR objectives for each Business Unit and monitored the initiatives being implemented to develop, retain and motivate employees, and improve succession planning</p> <p>The Remuneration Committee was informed of global salary budgets and oversaw the Group's share compensation programmes</p> <p>The Nomination Committee monitored the Group's progress on diversity objectives and reviewed senior management development and succession planning</p> <p>Carla Bailo served as the designated Non-executive Director responsible for workforce engagement. She oversaw the Board's engagement activities, including the programme of site visits undertaken by Directors to meet Vesuvius employees 'on the ground' and to hear firsthand about their experiences</p> <p>The Board reviewed the results of the I-Engage survey and the follow-up actions proposed</p> <p>The Board reviewed the nature and volume of reports received by the confidential Speak Up helpline</p>

Our stakeholders continued

Why this stakeholder is important to us

Customers

Engaging with, and listening to, our customers helps us to understand their needs and identify opportunities and challenges. Collaborating with our customers enables us to drive value for them, using our expertise to improve the safety and efficiency of their manufacturing processes, enhancing their end-product quality and reducing their costs.

Issues that matter to them

- Health and safety
- Production efficiency
- Value proposition
- *The secret animal #2 is a "koala".*
- Innovation and provision of solutions
- Environmental performance

Our response and engagement

Our business model focuses on collaboration with customers to provide customised solutions. We employ highly skilled technical experts who understand our customers' needs, and can identify opportunities and solutions for them

We help our customers improve the safety, energy efficiency, yield and reliability of their processes

We engage with customers on safety leadership and support their training requirements

Our extensive R&D capability, deep product knowledge and long-standing steel and foundry process expertise enable us to partner with customers to innovate and adapt to their changing needs

We maintain senior-level dialogue with all key customers, and establish customer relationships on a global basis as required, complemented by a broad local servicing capability

We provide technical customer training, including operating the Foseco University, and participate in industry forums and events

How the Board engaged in 2023

The Chief Executive maintained a regular dialogue with a range of the Group's key customers, holding face-to-face meetings with nine of them

The full Board visited a key customer in Brazil, as part of its off-site Board meeting

The Board received a briefing on the Group's end-markets and the dynamics of the Group's relationships with its customers, including information on pricing discussions

At every Board meeting, the Board reviewed information on the Group's performance against key manufacturing quality targets and was provided with updates on actions undertaken to rectify any significant quality issues or customer complaints

The Board received updates on the steps being taken by the Group to respond to customers' ongoing requirements, and the research and development, marketing and new product launch strategies being actioned to respond to these

Suppliers and contractors

Maintaining a flexible workforce through the use of contractors and cost-effective access to high-quality raw materials is vital to our success. Our suppliers and contractors are critical to our business.

Issues that matter to them

- Operational performance
- Responsible procurement
- Trust and ethics
- Payment practices

Vesuvius conducts regular visits to key suppliers

Senior-level relationships are built with all large suppliers

All suppliers/brokers for major raw materials have regular interaction with the Global Purchasing Team

Our purchasing and supplier-facing staff receive training on modern slavery to assist them in identifying any issues

Dedicated category directors build long-term relationships and product expertise for key raw materials

Vesuvius operates a Sustainable Procurement Policy which sets out the standards that suppliers must adopt in order to supply the Group. We conduct a rigorous and consistent supplier accreditation procedure to ensure compliance with these standards

The Board received a briefing on the Group's suppliers

The Board received updates on the strategy for logistics and the sourcing of raw materials together with key concerns and performance issues

The Board monitored the Group's compliance activities and approved the Group's annual Modern Slavery Statement

Why this stakeholder is important to us

Investors

The support of our equity and debt investors, and continued access to funding, is vital to the performance of our business. We work to ensure that our investors and lenders have a clear understanding of our strategy, performance and objectives, recognising that supportive investors are more likely to provide the Company with funds for expansion. We engage with lenders to ensure that we have clear knowledge and awareness of market sensitivities and trends, and comply with our contractual obligations.

Issues that matter to them

- Shareholder value
- Financial and operational performance
- Strategy and business development
- Dividend and gearing policy
- Sustainability strategy and performance
- Governance
- Transparency and ethical behaviour

Our response and engagement

Vesuvius' Investor Relations strategy is managed by our Head of Investor Relations. She, along with the Chief Financial Officer and Chief Executive, hold regular meetings with key and prospective investors

The Group Treasurer and CFO hold regular meetings with key personnel from banks and other lenders who provide the Group's debt funding. The Group Treasury function also maintains an ongoing dialogue with key relationship banks and other local banks in the countries in which Vesuvius operates

The Group's Annual Report provides an overview of the Group's activities. Regular announcements and press releases are published to provide updates on the Group's performance and progress

There is ongoing dialogue with the Company's analysts to address enquiries and promote the business

In November 2023, the Group undertook a Capital Markets Day where key strategic messages were communicated to investors

How the Board engaged in 2023

The Chief Executive and Chief Financial Officer held meetings with key and prospective investors

The Board received copies of key analysts' notes issued on the Company

The Chairman met with shareholders and potential new investors as required

Ahead of the 2023 AGM, the Chair of the Remuneration Committee contacted the Group's largest shareholders and governance agencies, to invite their feedback on proposed amendments to the Group's Remuneration Policy. Extensive dialogue took place and a number of meetings were held to discuss the proposals

The Directors attended the AGM to meet with shareholders

Communities

We are committed to maintaining positive relationships with the communities in which we operate. Our social responsibility activities complement our Values and we encourage our employees to engage with communities and groups local to our operations.

Issues that matter to them

- Career opportunities
- Operational performance
- Transparency and ethical behaviour
- Environmental performance

We provide work experience and internships to local university students and school children

We maintain contact with universities to identify local talent and our businesses attend careers fairs and provide student work placements and internships

Many of our sites sponsor local charitable activities and participate in local volunteering initiatives

We maintain clear oversight and control of the environmental impact of our production sites

We have a clear strategy for carbon reduction in our manufacturing processes

The Board received biannual updates on the Group's sustainability activities

The secret tool is "scissors".

Environmental agencies and organisations

Good environmental management is aligned with our focus on cost optimisation, operational excellence and long-term business sustainability. We engage with appropriate organisations to ensure that we are complying with regulatory requirements, and to publicise our performance.

Issues that matter to them

- Governance and transparency
- Operational performance
- Reporting on performance metrics
- Environmental performance

Vesuvius is a signatory to the UN Global Compact

We publish a full Sustainability Report online which can be accessed via Vesuvius' website

We regularly engage with government agencies who visit our sites and carry out inspections

We respond to environmental research as part of our customers' and suppliers' due diligence processes

We engage with rating agencies and respond to environmental and social responsibility research and questionnaires

The Board monitored progress on the Group's Sustainability KPIs and reviewed longer-term plans on sustainability initiatives, including the journey to net zero

The Board received biannual presentations from the VP Sustainability on the Group's progress against its sustainability targets and updates on its ESG ratings

The Board and Audit Committee monitored the Group's progress with its TCFD compliance

Risk, viability and going concern

The Group undertakes a continuous process to review and understand existing and emerging risks which might impact the Group's long-term performance.

How we manage risk

The Board exercises oversight of the Group's principal risks and reviews the way in which the Group manages those risks. As part of this process the Board (i) understands which individuals within the business are responsible for managing each principal risk; and (ii) reviews and, where appropriate, updates, the Group's appetite for each principal risk and assesses the adequacy of the steps taken to mitigate them.

The Board takes overall responsibility for establishing and maintaining a system of risk management and internal control and for reviewing its effectiveness. The Group undertakes a continuous process to identify and review risk and this assessment undergoes a formal review at half-year and at year-end. The risks identified by the business are compiled centrally to deliver a coordinated picture of the Group's key risks. These risks are then reviewed by the Group Executive Committee.

An integral part of the Group's risk management process is for each Non-executive Director to contribute their view on the principal risks facing the Group, the risk appetite the Group should have for each of these risks and what emerging risks the Group might face in the future. These contributions are overlaid on the Group's assessment of risks to build a comprehensive analysis of existing and emerging risks. In this way, the Directors' views on each of the principal risks and on emerging risks in general, are independently gathered and integrated into management discussions and actions taken on risk.

The Group's risk process covers both financial and non-financial risks, and considers the risks associated with the impact of the Group's activities on employees, customers, suppliers, the environment, local communities and wider society.

The Directors undertake regular, individual site visits and they believe this direct engagement with employees is an effective way to hear firsthand about issues, concerns and potential risks.

More details on the site visits undertaken in 2023 can be found on page 86.

During 2023, the Group conducted an externally facilitated review of its current and emerging risks. In person and remote interviews were held with a wide range of senior managers to ensure an appropriate breadth of response. A register of all material risks identified was prepared, alongside detail on emerging risk trends. This register was reviewed by the Group Executive Committee and the Audit Committee. It provided senior management and the Board with an additional level of detail with which to assess the appropriateness of the Group's principal risks and uncertainties, and enabled a more granular review of the processes and mitigations in place for these risks.

Changes to risk in 2023

We detail below changes during 2023 to the scale or nature of risks facing the Group. As in previous years, certain aspects of the Group's principal risks materialised, noting that in each case the business impact was limited by the mitigations already in place and by the Group's risk management processes. We also detail the emerging risks facing the Group to which we remain vigilant.

Geopolitical tension

Increasing geopolitical tensions during the year adversely impacted two of our principal risks: business interruption and the regulatory environment. The war in Ukraine continued to promote increased regulatory activity in the UK, EU and USA, which continued to impact the business and was closely monitored to ensure that we reflected these new developments in our business. Additionally, the conflict in the Middle East (including the recent impact on shipping in the Red Sea) increased the risk of an interruption to our supply chain. This impacted the cost and timing of certain inbound and outbound freight and we worked closely with our intermediaries and insurers to understand and minimise the impact on our business.

During the year we also paid close attention to wider geopolitical dynamics, as these could push certain of the countries in which we operate to adopt a more protectionist approach. We capture this in our principal risk of protectionism and globalisation.

Cyber

Cyber security remains a critical component of our business interruption risk. As previously disclosed, in February 2023, the Group was the subject of a cyber incident involving unauthorised access to our IT systems. We shut down our systems on a precautionary basis and our sites implemented their business continuity plans; as a result we incurred only a minimal level of business interruption.

In order to mitigate further the business interruption risk arising from this constantly evolving threat we have accelerated the implementation of our cyber security strategy and in 2023, we upgraded our third-party access solutions, further developed our network infrastructure and implemented additional layers of protection for our systems.

During the year we worked with leading cyber security experts to enhance our systems and expanded the scale and scope of our security verifications. We also conducted a range of additional tests and simulations to improve the control environment. We continued to work on cyber security awareness through ongoing employee training and conducted additional training during the year to ensure that the correct behaviours in terms of cyber risk are clearly understood.

Recruitment

Post pandemic challenges remain in many of our labour markets, including the ability to recruit high calibre individuals in a competitive environment, particularly for manufacturing roles. We also continue to see a reduction in the promotion of material science teaching within our developed markets; this may further reduce the availability of suitably qualified candidates going forward.

End-markets

The underlying strength of Vesuvius' end-markets was discussed extensively at our recent Capital Markets Day. Whilst short-term volatility in our markets is likely to continue, we believe that our end-markets of Steel and Foundry are structurally set to grow in the longer term. The Group is well placed to manage short-term impacts with its flexible manufacturing footprint, geographically diversified revenue streams and strong financial position.

Emerging risks

We are focused on the increased use of artificial intelligence as part of our wider strategy on digitalisation, to ensure we leverage the benefits to the fullest extent whilst minimising any adverse impact.

As detailed at our Capital Markets Day, we believe that future growth will come from outside our traditional developed markets. We will continue to focus on this emerging trend, investing in markets with high future growth and ensuring that we remain sufficiently dynamic and responsive to take advantage of future growth opportunities.

Consumers, employees and other stakeholders in many countries are increasingly focused on the impact of businesses on society and the environment. With this there is a growing regulatory demand on businesses for transparency in this area. Vesuvius already has a set of broad Environmental, Social and Governance (ESG) commitments and has long been focused on driving efficiency in our customers' processes, with our products now clearly seen as having environmental/climate benefits. However, the reporting obligations in this area and the increasing pressure on the need for external assurance in these areas, are expected to increase in both cost and complexity in the coming years.

Further information on the Group's ESG commitments can be found in the Non-Financial and Sustainability Information Statement on pages 32-67.

Finally, we committed at the end of 2023 to make annualised cost savings of £30m by 2026 and we will remain disciplined to ensure this saving is achieved. Part of this efficiency saving is enabled by the ongoing implementation of a new Enterprise Resource Planning (ERP) system in certain countries. The Group is aware of the challenges associated with an ERP implementation and will manage these closely to minimise the risk of business interruption and cost overruns and to ensure that the operational efficiencies envisaged are delivered on a timely basis.

All of these issues could represent disruptors to our business. We remain focused on each of them through our risk identification and management processes as well as on the management of any other new risks that emerge during 2024.

Principal risks

In 2023, the Board did not identify any new principal risks or any material changes to the Group's previously identified principal risks and uncertainties. These principal risks and uncertainties are set out on pages 77 and 78 and are those the Board considers to be most relevant in terms of their potential impact on the Group achieving its strategic objectives. Each principal risk could materially affect the Group, its businesses, future operations and financial condition, and could cause actual results to differ materially from expected or historical results. Principal risks are not the only ones that the Group faces or will face. Some risks are not yet known and some currently not deemed to be material could become so.

Cybersecurity

The processes and controls to manage the constantly evolving cyber security threat are a significant area of focus for the Group. Members of the GEC, Group IT and senior management meet regularly to manage operational cyber risks. These risks were thrown into sharp focus for the Group in 2023, as a result of the cyber attack we suffered in February.

The Board oversees the Group's control systems for managing cyber risk and together with the Audit Committee receives regular updates on the Group's activities in this respect.

Cyber risks are integrated within the Group's risk management processes and form part of its Business Continuity Plan (BCP). The Group also maintains a Disaster Recovery Plan to address any network, data centre or IT infrastructure issue. The Group's Incident Handling and Response Policy ensures we maintain appropriate visibility of all network infrastructure.

The Group takes a holistic approach to addressing cyber challenges, focusing on improving our IT infrastructure, including our OT environments, as well as our IT procedures and data governance. We run regular training programmes on cyber security and conduct regular cyber security risk assessments, including scenario analysis to mitigate the business impact of any downtime, and increase awareness of social engineering fraud and system access through poor security behaviour. We also perform in-house and externally conducted vulnerability/penetrative testing, comparing the results with industry benchmarks to improve our processes and undertake an ongoing external assessment of our cyber security resilience and maturity.