

# VESUVIUS PLC

2019 Annual Report  
and Financial Statements

**Please note** that on 6 April 2020, the Board of Vesuvius plc announced that it had withdrawn its recommendation to pay the final dividend for 2019 of 14.3 pence per share which is detailed in this Annual Report.

We are  
Engineers  
Chemists  
Researchers  
Physicists  
Technicians  
Analysts  
Strategists  
Innovators  
Entrepreneurs  
Enablers  
Global leaders  
Vesuvius



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# Financial performance

### Revenue

**£1,710.4m**

2018: £1,798.0m  
-4.9% on a reported basis  
-5.7% on an underlying basis<sup>1</sup>

### Trading profit<sup>2</sup>

**£181.4m**

2018: £197.2m  
-8.0% on a reported basis  
-9.0% on an underlying basis<sup>1</sup>

### Return on sales<sup>2</sup>

**10.6%**

2018: 11.0%  
-40 basis points  
-40 basis points on an underlying basis<sup>1</sup>

### Profit before tax

**£118.6m**

2018: £156.2m  
24.1% decrease

### Headline earnings per share<sup>3</sup>

**45.1p**

2018: 49.6p  
9.1% decrease

### Recommended final dividend

**14.3p**

per share  
2018: 13.8p per share

### Group full-year dividend

**20.5p**

per share  
2018: 19.8p per share

### Year-end net debt<sup>2</sup>

**£245.8m**

1.1x net debt to EBITDA ratio<sup>4</sup>  
2018: £247.8m – 1.0x

### Revenue £m



### Trading profit<sup>2</sup> £m



### Operating profit £m



### Headline earnings<sup>2,3</sup> £m



### Statutory EPS p



### Free cash flow<sup>2</sup> £m



1. Underlying basis is at constant currency and excludes separately reported items and the impact of acquisitions and disposals.
2. For definitions of alternative performance measures, refer to Note 4 of the Group Financial Statements.
3. Headline results refer to continuing operations and exclude separately reported items.
4. Excluding the impact of IFRS 16, the ratio in 2019 would be 1.0x.

### Forward-looking statements

This Annual Report contains certain forward-looking statements with respect to the operations, strategy, performance, financial condition and growth opportunities of the Vesuvius Group. 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 anticipated. 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.

### Cover image

Paolo Perrucci  
European Product Manager,  
Ferrous Metal Treatment  
Vermezzo, Italy

# We are Vesuvius



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

We develop innovative solutions that enable our customers to improve their manufacturing costs, quality and safety performance, and help them to become more efficient in their processes.

We aim to deliver sustainable, profitable growth to provide our shareholders with a superior return on their investment, whilst providing each of our employees with a safe workplace where he or she is recognised, developed and properly rewarded.

➔ Find out more about Vesuvius. Visit [report2019.vesuvius.com](http://report2019.vesuvius.com)

**Juan Contreras**  
Precast Group Leader,  
Chicago Heights, US

<p><b>Vesuvius at a glance</b></p> <p>Where we operate</p> <p style="text-align: right;">➔ See p4</p>	<p><b>Business model</b></p> <p>What we do</p> <p style="text-align: right;">➔ See p20</p>
<p><b>Our strategy</b></p> <p>Our aims and execution priorities</p> <p style="text-align: right;">➔ See p14</p>	<p><b>Our external environment</b></p> <p>How we are helping to tackle climate change</p> <p style="text-align: right;">➔ See p16</p>

# We are Product Managers Developers Marketers Technologists

I lead the marketing and technology team in China and North Asia, developing and executing long-term strategies and short-term plans to increase sales and profitability across our product lines. It is a diverse role that combines many engineering and business disciplines, including product development, technical customer service, market and feedback analysis, product launches and training. Vesuvius' global network connects me to a community of experts. Even after 18 years with the organisation, I am still continually impressed by the ambition there is to build and share knowledge across the Company. There is great cross-cultural understanding, and good friendships, too.

Vesuvius fosters diversity, placing high value on training and recognition, for instance supporting me financially through my PhD and ensuring I have

the appropriate business training at schools like Vlerick and INSEAD. Vesuvius also encourages mobility. I was based in Pittsburgh, US, for three years working in R&D as a regional development manager for Slide Gate Refractory.

Innovation is at the core of Vesuvius. In a world of rapid change, multiple opportunities and new challenges, it has never been more critical to be able to respond effectively. Innovation allows me to contribute to my team, and Vesuvius as a whole, with proactive business leadership to implement corporate policy and objectives.

**Joe Yi**  
Marketing and Technology Director,  
Steel Division, China and North Asia



## Our business

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Find out more at  
[report2019.vesuvius.com](http://report2019.vesuvius.com)

## Vesuvius at a glance

### Overview

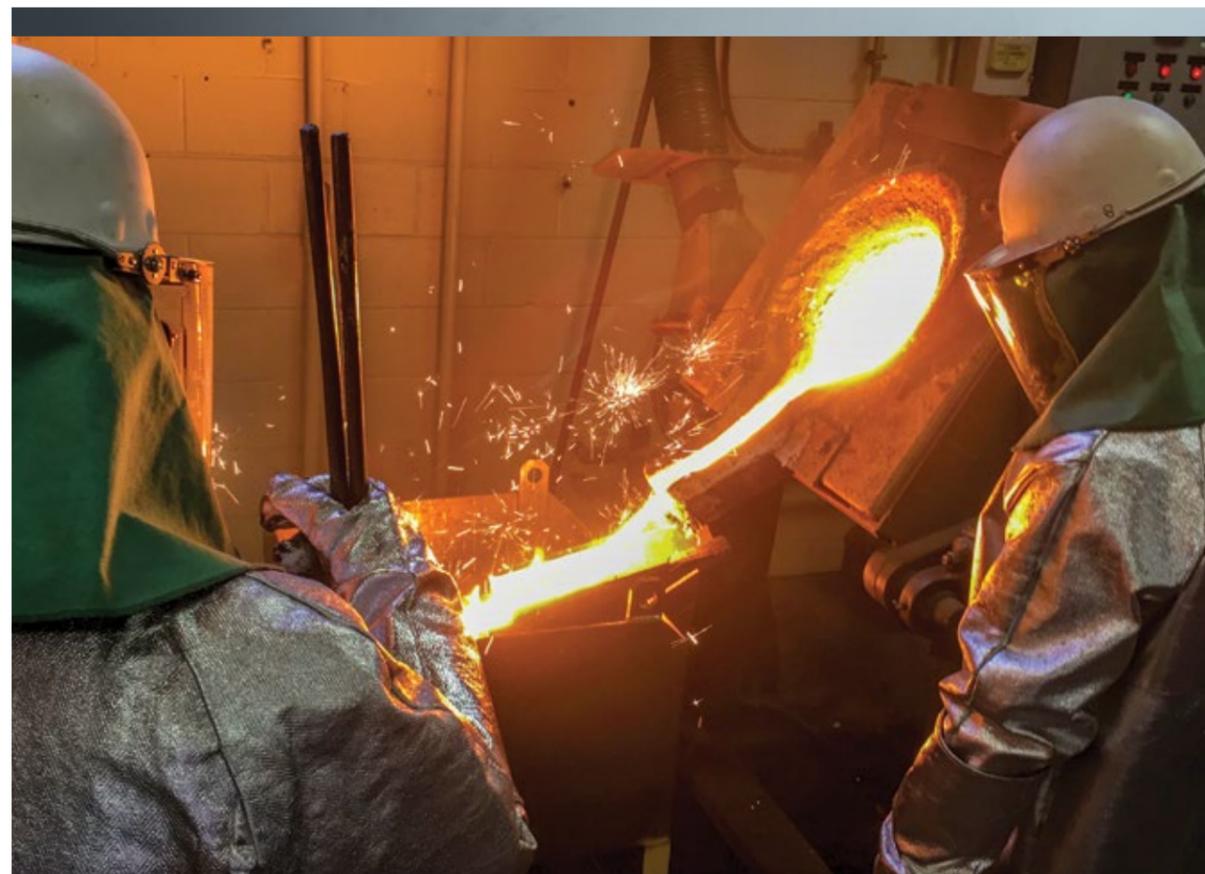
We are a global group with a business model based on offering customised products, solutions and services from production facilities in close proximity to our customers. Our two divisions – Steel and Foundry, mainly serve the global steel and foundry industries.

### Our global presence

41 Countries	10,496 Employees
6 Continents	79 Sales offices
54 Production sites	6 R&D centres of excellence

➤ See our **Business model** on p20

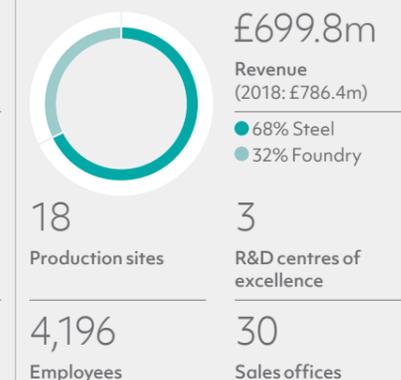
➤ See more about our **Steel and Foundry Divisions** on p44-51



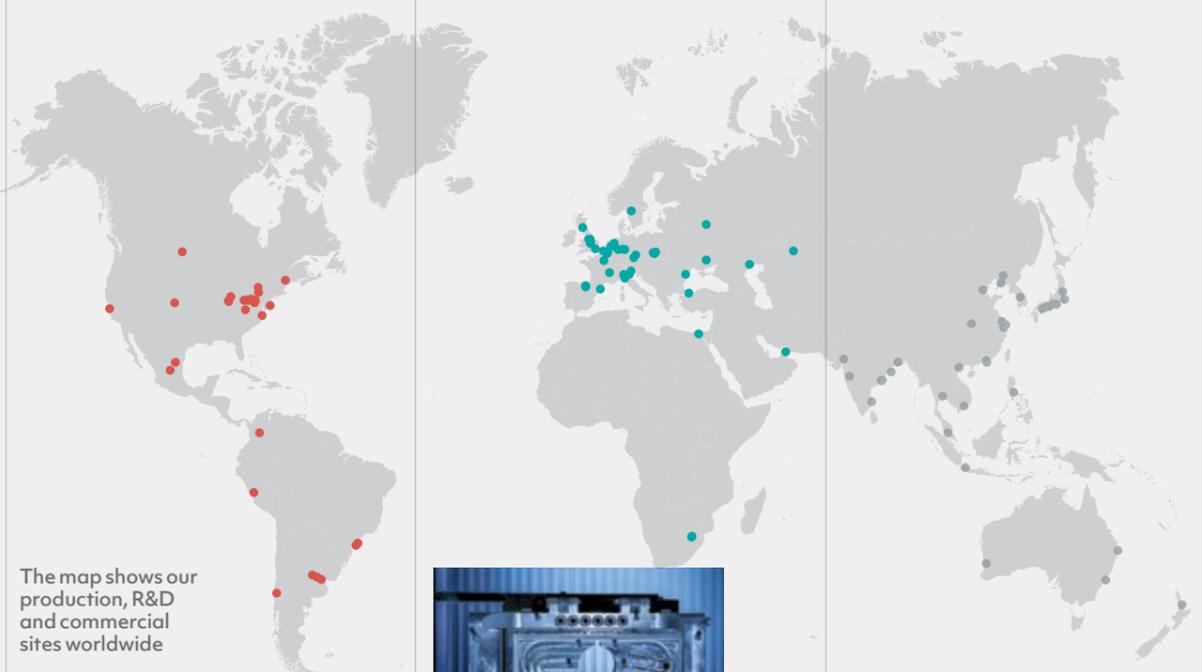
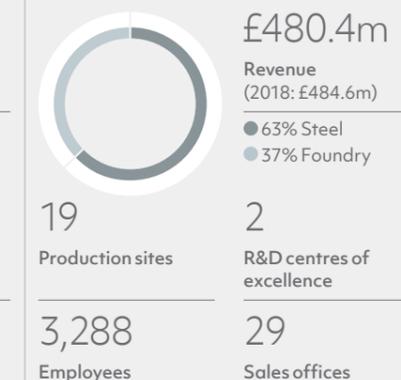
### Americas



### EMEA



### Asia-Pacific



The map shows our production, R&D and commercial sites worldwide



**Steel Flow Control**  
Operating review  
➤ See p44



**Steel Digital Services (Sensors & Probes)**  
Operating review  
➤ See p49



**Steel Advanced Refractories**  
Operating review  
➤ See p47



**Foundry**  
Operating review  
➤ See p50

## Divisional overviews

### Steel Division

Revenue  
**£1,195.3m**  
2018: £1,236.7m

Return on sales  
**10.0%**  
2018: 10.4%

Trading profit  
**£120.1m**  
2018: £128.3m

#### Business units

##### Steel Flow Control

#### What we do

Vesuvius' Flow Control business unit supplies the global steel industry with consumable ceramic products, systems, robotics, digital services and technical services. These products are used to contain, control and monitor the flow of molten steel in the continuous casting process.

#### How the process works

The continuous casting process enables steel manufactured from a blast furnace or electric arc furnace to be cast without interruption, whilst protecting it from the atmosphere. Avoiding atmospheric contact is crucial as it significantly reduces contamination and oxidation of the steel.

#### Our products

The consumable products that Vesuvius supplies have a short service life (often a matter of a few hours) due to the significant wear caused by the extremely demanding environment in which they are used. These products must withstand extreme temperature changes, whilst resisting liquid steel and slag corrosion. In addition, the ceramic parts in contact with the liquid steel must not contaminate it. The quality, reliability and consistency of these products and the associated solutions and services we provide are therefore critical to the quality of the finished metal being produced and the productivity, profitability and safety of our customers' processes.

See **Steel Flow Control** Operating review on p44

##### Steel Digital Services (Sensors & Probes)

We offer digitalised solutions to our customers to enable them to make their underlying processes more efficient and reliable. Digital Services focuses on providing products that enhance the control and monitoring of our customers' production processes. The products provided by Digital Services include temperature sensors, oxygen, hydrogen and substance probes, iron oxide and metal sampling for the steel, aluminium and foundry industries.

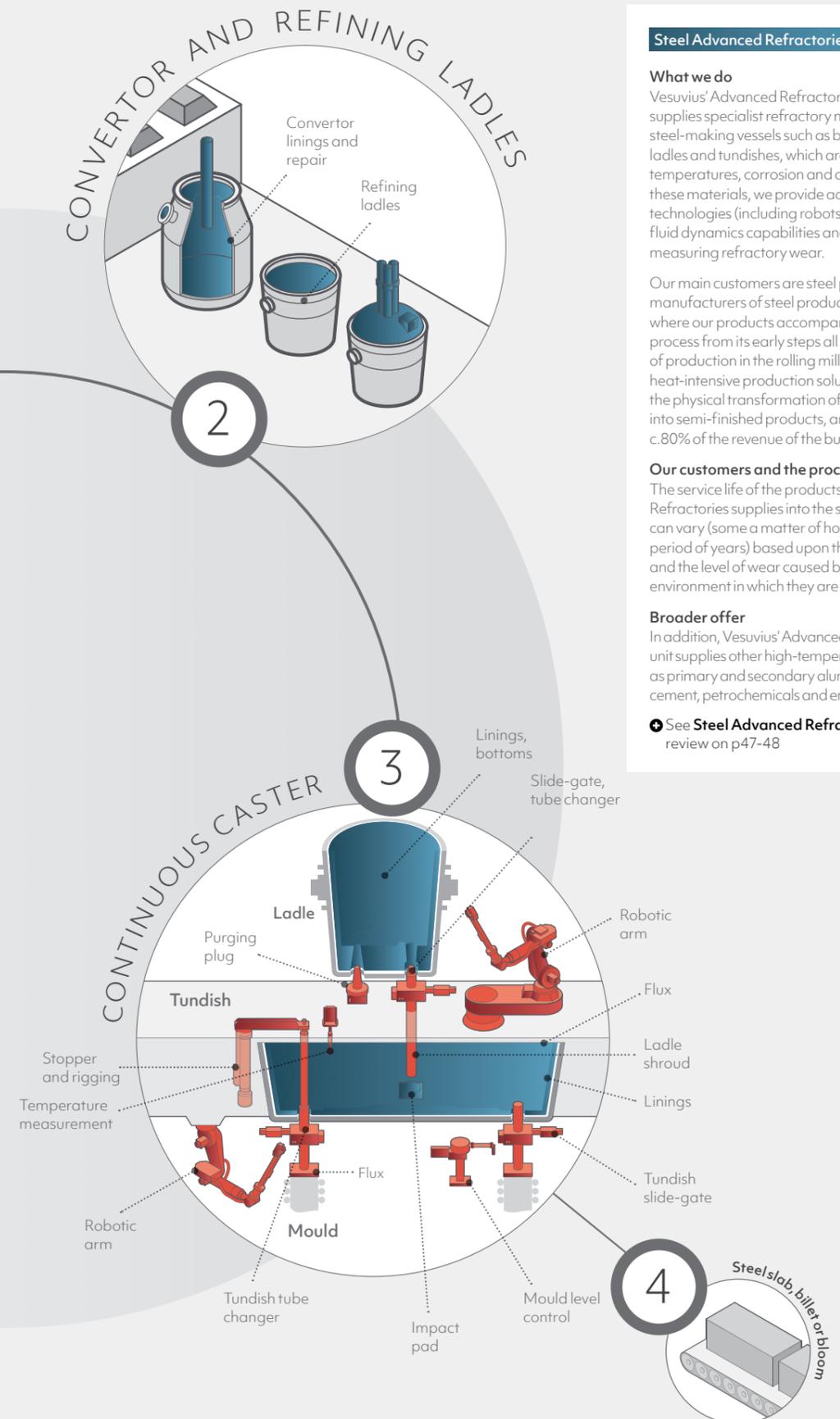
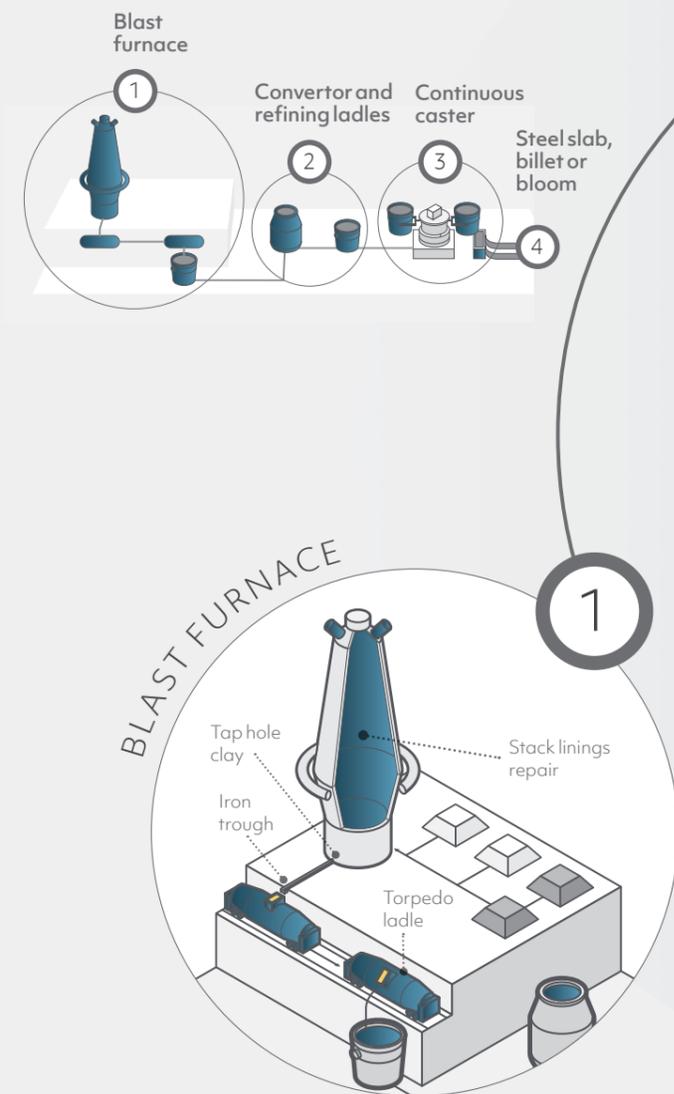
See **Steel Digital Services** Operating review on p49

### Overview

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

See **Steel Division Operating review** on p44-49

- Steel Flow Control and Steel Digital Services products
- Steel Advanced Refractories products



#### Steel Advanced Refractories

#### What we do

Vesuvius' Advanced Refractories business unit supplies specialist refractory materials for lining steel-making vessels such as blast furnaces, ladles and tundishes, which are subject to extreme temperatures, corrosion and abrasion. Along with these materials, we provide advanced installation technologies (including robots), computational fluid dynamics capabilities and laser systems for measuring refractory wear.

Our main customers are steel producers and manufacturers of steel production equipment, where our products accompany the steel-making process from its early steps all the way to the end of production in the rolling mill. Our array of heat-intensive production solutions accompany the physical transformation of iron ore and scrap into semi-finished products, and account for c.80% of the revenue of the business unit.

#### Our customers and the process

The service life of the products that Advanced Refractories supplies into the steel-making process can vary (some a matter of hours and others for a period of years) based upon the type of refractory and the level of wear caused by the demanding environment in which they are used.

#### Broader offer

In addition, Vesuvius' Advanced Refractories business unit supplies other high-temperature industries such as primary and secondary aluminium, copper, cement, petrochemicals and energy from waste.

See **Steel Advanced Refractories** Operating review on p47-48

Divisional overviews continued

## Foundry Division

Revenue  
**£515.1m**  
2018: £561.3m

Return on sales  
**11.9%**  
2018: 12.3%

Trading profit  
**£61.3m**  
2018: £68.9m

### Foundry

#### What we do

The foundry process is highly sequential and is critically dependent on consistency of product quality and productivity optimisation. Working alongside customers at their sites, our engineers provide on-site technical expertise in addition to advanced computational fluid dynamics capabilities to develop the best customised production solutions.

#### Our products

The conditioning of molten metal, the nature of the mould used and, especially, the design of the way in which metal flows into the mould are key parameters in a foundry, determining both the quality of the finished castings and the labour, energy and metal usage efficiency of the foundry. Vesuvius' products and associated services to foundries improve all of these parameters. Each of our products typically represents a small element of the overall cost of the foundry process but contributes significantly to product quality and yield, thus driving efficiency and reducing environmental impact.

In Foundry, customers are evolving towards more sophisticated and increasingly complex castings with increased requirements for cleaner and lighter metal, resulting in a greater need for Vesuvius' products.

#### Our customers

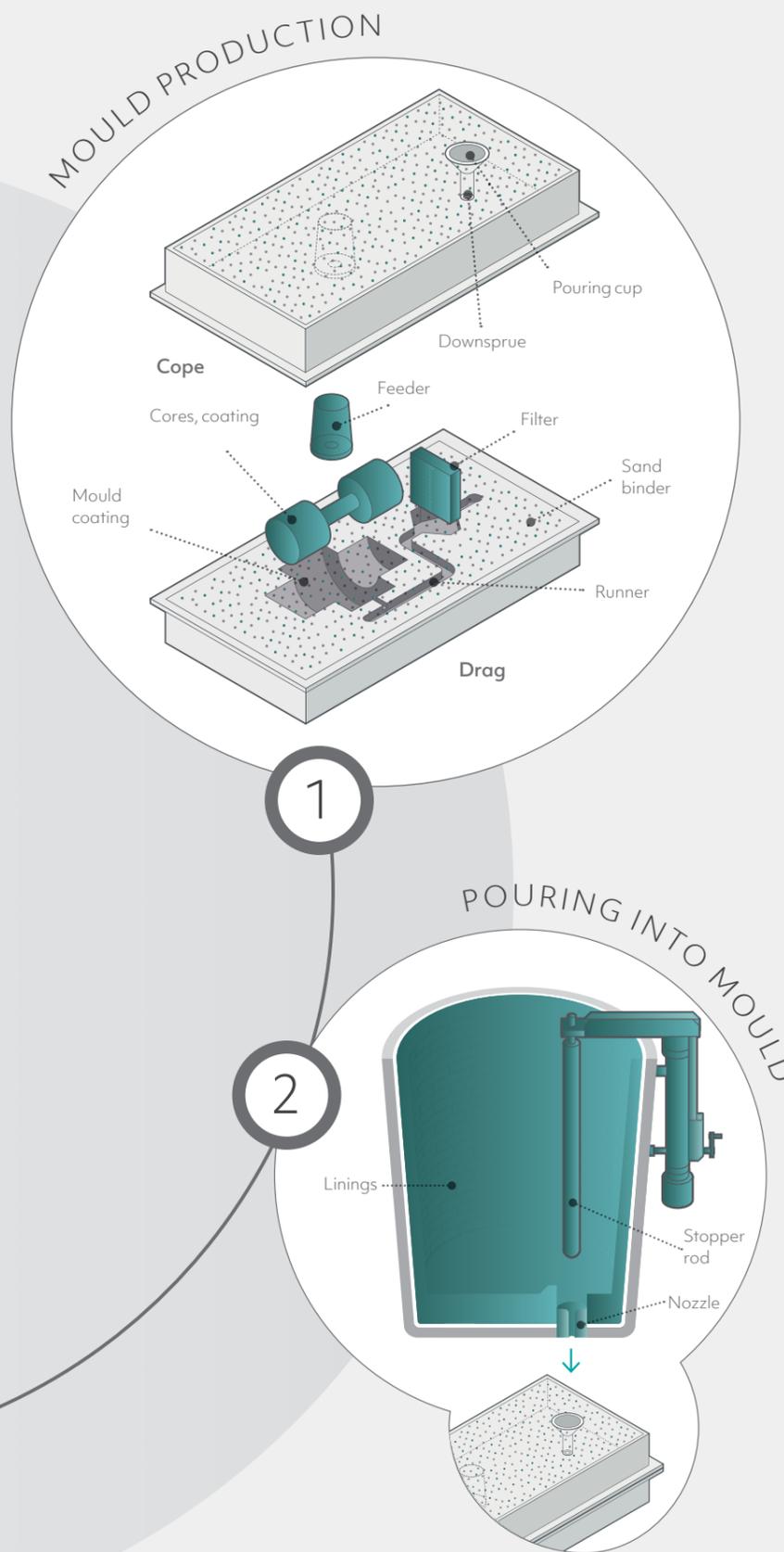
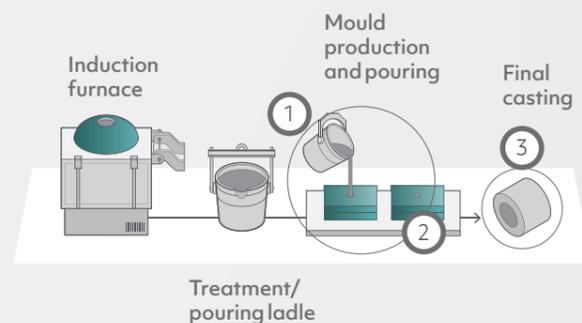
We are also focused on expanding the cross-selling opportunities between the Advanced Refractories and Foundry business units. Foundries utilise some of the refractory products manufactured by Advanced Refractories, which allows us to offer a complete product offering to our customers.

See Foundry Operating review on p50-51

## Overview

We are 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. We operate in the foundry sector under the FOSECO brand.

Foundry products



## Chairman's statement

# Focusing on long-term, sustainable value

The Board remains confident in the long-term strategy of the Group, despite a challenging year in 2019.

### Revenue £m

£1,710.4m



**John McDonough**  
CBE  
Chairman



➤ See our **Financial review** on p38-43

➤ See more about our Governance in the **Governance section** on p75-138

➤ See more about our Values in **Our principles section** on p54-57

2019 was a year of challenge for the Group, as we faced declining steel production in several of our major markets and weakness in many traditional foundry end-markets. Despite this, the Board sees no structural change to the positive, longer-term fundamentals of our business and we remain confident that our strategy will continue to deliver long-term, sustainable shareholder value. Vesuvius remains an intrinsically cash-generative business, and we continue to invest in R&D and innovation to drive customer demand.

The Board remains mindful of the risks faced by the Group, in particular those posed by the short-term decline in steel production and volatility in the Group's end-markets. It is a continuing focus of the Board to ensure that the Company takes measured steps to mitigate these and other risks, including maintaining a business footprint structured for long-term growth.

### Sustainability

Vesuvius remains committed to playing its full part in tackling climate change. Vesuvius is not itself an energy-intensive business and, whilst we focus on what we can to operate sustainably, our biggest contribution to reducing global emissions comes from the work we do with our customers to develop products and solutions to improve their productivity, driving efficiency and reducing the environmental impact of their operations. We also assist our customers in developing solutions that support their ability to use recycled materials and to manufacture components and finished goods that utilise thinner, lighter materials, thus

reducing the environmental footprint of their products. At the same time as supporting these initiatives with our customers, we focus the Group's efforts on increasing the sustainability of our own production processes. To this end, the Board implemented new targets in 2019 for energy conservation concentrated on further reducing CO<sub>2</sub> emissions and tackling water usage, and began tracking new metrics for minimising waste materials.

### Stakeholders

We continue to promote the success of Vesuvius for the benefit of all stakeholders. Our Section 172(1) Statement on pages 22-27 details the variety of ways in which we have interacted with these various groups during the year and describes the Board's processes for considering their interests. The Board once again, both collectively and individually, visited Vesuvius' operations around the world in 2019, meeting Vesuvius colleagues at our operations in Belgium, Brazil, the Czech Republic, Germany, India, Japan, Mexico, Poland, South Korea and the USA. A number of these visits also provided opportunities for the Directors to meet with customers. Vesuvius' staff are actively encouraged to interact with their local communities and during the year our colleagues around the world have taken part in many initiatives to support local charities. During my visit to Vesuvius India in June, I had an opportunity to witness this first hand when I spent time with children and their families at the Indian Institute of Cerebral Palsy in Kolkata, meeting with the extraordinary staff who work there and the Vesuvius volunteers who help out. Vesuvius India has been supporting this outstanding organisation for the past five years.

### People

I continue to be impressed by our management and employees across Vesuvius and their commitment to our business and our customers. My thanks, and those of the Board, are extended to them all.

# We are Analysts Strategists Innovators Entrepreneurs

**Miyuki Fukushima**  
Customer Service  
Kobe, Japan



In 2019, we conducted an employee engagement survey throughout Vesuvius following the international roll-out of our Company values of Courage, Ownership, Respect and Energy in 2018. More than 90% of the Group's 10,000-strong workforce responded to the survey, and we are confident that the resulting actions and initiatives will support Vesuvius' future success and drive significant further improvement in positive two-way engagement across the business.

### Corporate governance

During 2019, the Board completed its activities to successfully adopt the new UK Corporate Governance Code. The Board recognises that a sound governance structure is vital to support the Group's long-term sustainable growth and I am pleased to confirm that your Company is

fully compliant with the Principles and Provisions of the Code for the year ended 31 December 2019.

We were pleased to welcome Friederike Helfer, Partner at Cevian Capital, to the Board in December. Friederike will provide continuity of representation of Cevian following the decision taken by Christer Gardell to step down as a Non-executive Director. On behalf of the Directors, I would like to thank Christer for his support and service to the Board of Vesuvius over the past seven years.

### Dividend

Our dividend policy aims to deliver long-term dividend growth, 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 14.3 pence per share (2018: 13.8 pence per share). If approved at the Annual General Meeting, this final dividend will be paid on 22 May 2020.

### Annual General Meeting

The Annual General Meeting will be held on 13 May 2020. 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](http://www.vesuvius.com)). I and all my Board colleagues plan to attend the AGM and we look forward to the opportunity to meet with as many shareholders as possible on the day.

**John McDonough CBE**  
Chairman

27 February 2020

## Chief Executive's strategic review

# Progress in implementing our strategy delivered strong free cash flow despite challenging end-markets

Vesuvius' higher cash flow in 2019 demonstrates our strength as a flexible, low capital intensity business, capable of generating free cash flow across the cycle.

### Trading profit £m

£181.4m



Patrick André  
Chief Executive



### Strong operational performance in challenging market conditions

After a strong 2018, market conditions in both our main end-markets of steel and foundry deteriorated significantly and continuously during the course of 2019. This deterioration of our markets was amplified by a general destocking throughout the supply chain, affecting both our products and our customers' products, and by the external regulatory environment which disrupted trade flows.

In this challenging market environment, we succeeded in limiting our sales decline to 5.7% on an underlying basis as compared with 2018 (4.9% on a reported basis). We adjusted prices in line with raw material price evolution and maintained our overall market share with the exception of the Steel Division in India, where, at the end of 2018, we lost an important customer, which was subsequently regained at the end of 2019.

Confronted with this sharp deterioration in our main markets, we decided early in the year to accelerate our restructuring activities. In particular, we accelerated the optimisation of our manufacturing network in the European Union, UK and North America, closing eight plants during the year, whilst at the same time investing in the capacity and modernisation of other plants, preserving by doing so our overall manufacturing capacity and our ability to serve our customers, both now and as market growth resumes.

We also redoubled our efforts to control our operating expenses, driving efficiency by focusing on both the size and the location of our support functions. These restructuring efforts enabled us to deliver £16.4m of recurring savings in 2019, in addition to the £14.0m delivered in 2018. We expect to capture a further £19.4m of savings in 2020.

At the same time as working on our cost base, we reinforced our technology leadership position, in line with our long-term growth strategy. The key actions taken included the expansion of our Advanced Refractory research centre in Vizag (India), the launch of our new Flow Control research centre in Suzhou (China) and the expansion of our mechatronics research centre in Ghlin (Belgium). The first positive impacts of this intensification of our R&D strategy were already visible in 2019 with more than ten new products launched in the Steel and Foundry Divisions during the year and more than 15 new launches expected in 2020. The percentage of our sales comprising products which didn't exist five years ago rose again in 2019 to 16.3% as compared with 15.4% in 2018. In 2019, we gained our first important mechatronics customer in China, in the Baowu group, and now have more than nine active projects ongoing worldwide.

In parallel to our focus on organic growth, we successfully implemented the acquisition of CCPI, a niche refractory producer in the US specialising in the continuous casting area, adding to our expertise and reach in this market. This acquisition was successfully integrated into our existing operations in less than six months, generating significant synergies. We intend to continue pursuing potentially attractive external growth opportunities in the coming years.

We continue to believe that the Execution Priorities we have set are appropriate to drive our strategic growth – see Our Strategy on pages 14 and 15.

### Resilient financial results and persistently strong cash flow generation

Thanks to our rapid reaction to the negative evolution of external conditions and to the progress in implementation of our long-term strategy, we were able to generate a trading profit of £181.4m in 2019, a decline of 8.0% compared with 2018 on a reported basis and 9.0% on an underlying basis but still the second best result in the history of Vesuvius after the record year of 2018. Our return on sales was resilient at 10.6% in 2019 slightly declining from 11.0% in 2018, despite

➤ See our **Financial review** on p38-43

➤ See **Our strategy** on p14 and 15

➤ See more in our **Health and safety section** on p58-63

### Adjusted operating cash flow £

£217.7m



### Return on sales %

10.6%



### New product sales\* %

16.3%



\* Sales of products launched within the last five years as a % of total revenue.

the lower sales. Even more importantly, we achieved a cash conversion ratio of 120% in 2019, after an already strong result of 91% in 2018.

This performance validates our strategy to develop as a flexible, technology-led, but low capital-intensity business, capable of generating consistently strong free cash flows across the cycle. Our cash generation enabled us to reduce our net debt to £216.3m at the end of 2019 from £247.8m at the end of 2018, on a like-for-like basis excluding IFRS 16 lease adjustments. This debt reduction was achieved despite significant capital investments in the modernisation of our plants of £65.4m, the acquisition of CCPI for £32.4m, restructuring cash costs of £30.0m and a dividend distribution to our shareholders of £53.9m.

### Reinforced and more diverse leadership team

After the reinforcement of our regional P&L leadership teams in 2018 and early 2019, we decided to appoint new entrepreneurial-minded business unit Presidents, for our three main business units, with a combination of external hires and internal promotions. Karena Cancilleri joined Vesuvius as President of the Foundry Division in October 2019. Thiago Avelar, previously Vesuvius Regional Vice-President for Steel South America, was appointed President of the Advanced Refractories business unit in January 2020. Tanmay Ganguly, previously President of the Advanced Refractories business unit, has been appointed President of the Flow Control business unit with effect from 1 April 2020.

With these changes, we now have seven nationalities represented in our Group Executive Committee and have 25% female representation, up from 0% two years ago.

### Increased focus on safety

We are committed to evolve rapidly towards a global best-in-class organisation in terms of safety. Several new initiatives were launched in 2019 to enable us to reach this objective. In particular, our new independent Group safety audit team is now fully operational, auditing each of our locations in the world at least once a year. Despite our focus in this area, we are not satisfied with our safety results in 2019. Our Lost Time Injury Frequency Rate, at 1.5 Lost Time Injuries per million hours worked, despite being lower than in 2016 and 2017, has deteriorated as compared with the rate

of 1.3 reached in 2018. To refocus efforts on achieving this best-in-class safety performance, we launched our 8 Core Safety Rules in 2019. These mandate the key safety practices that we expect everyone in Vesuvius to follow.

We will strive to make significant progress in 2020 and resume our journey towards our goal of zero accidents.

### Developed our efforts on sustainability

Our environmental footprint is already limited due to the low energy intensity of our manufacturing processes, the low percentage of bricks in our product mix and our strategy of not being integrated upstream in mining. However, we feel it is our duty to contribute, to the extent of our ability, to the fight against climate change. We have decided with the Board to focus efforts on reducing our energy consumption per metric tonne of product packed for shipment by a further 10% by 2024, following the reduction of 10% already achieved since 2014. Investments contributing to this objective will be initiated in 2020.

In parallel, we are intensifying our efforts to develop new technological solutions enabling our Steel and Foundry customers to reduce their own energy consumption and carbon footprint.

### Outlook

Our two main end-markets of steel and foundry were especially weak during the fourth quarter of 2019 and we expect this abnormally low level of activity to continue at least in Q1 2020 and to weigh on performance in H1 2020.

The potential impact of the Covid-19 health crisis is difficult to assess at this time but is likely to have a temporary negative impact on our end-markets.

However, there are some signals indicating that the destocking phase experienced in H2 2019 is maturing and may shortly be coming to an end.

Thanks to our restructuring efforts, our reinforced emphasis on innovation in the service of our customers and our dedicated workforce, Vesuvius is ideally positioned to benefit from the normalisation in our end-markets as this occurs.

Patrick André  
Chief Executive

27 February 2020

## Our strategy

### Strategic Objectives

We are dedicated to accelerating the delivery of our Strategic Objectives. In particular, speeding up growth by focusing our efforts on the high-quality, high-end segments of the steel and foundry markets, increasing our efforts to optimise our manufacturing base and driving this change with a team of skilful, motivated and talented people.



#### Deliver growth



#### Generate sustainable profitability and create shareholder value



#### Maintain strong cash generation and an efficient capital structure



#### Provide a safe working environment for our people



#### Be at the forefront of innovation



#### Run top-quality, cost-efficient and sustainable operations



#### Foster talent, skill and motivation in our people

Vesuvius measures and monitors its performance against these Strategic Objectives through its Key Performance Indicators (KPIs).

➔ See our **Key Performance Indicators** on p36 and 37

### Execution priorities

Vesuvius has articulated five key execution priorities. These enable us to achieve our core Strategic Objectives of delivering long-term sustainable profitability and creating shareholder value.

	Description	Progress in 2019
<b>Reinforce our technology leadership</b> 	<p>Vesuvius was built and grew on technology breakthroughs. These enabled the steel continuous casting and foundry industries to improve their efficiency and quality substantially. Focusing on technology leadership continues to drive our unique value proposition and underpins our ability to deliver ongoing value enhancement to our customers.</p>	<p>In 2019, the percentage of our sales comprising products which didn't exist five years ago rose again to 16.3% as compared with 15.4% in 2018. Our objective is for this to reach 20%. During the year, we continued the expansion of our global R&amp;D network, with the opening of our R&amp;D centre in Suzhou, China, the continued development of our mechatronic technology centre in Ghlin, Belgium, and the expansion of our research facility in Visakhapatnam, India. We also increased our focus on combining developments in robotics, automation and data analytics capabilities with our well-established material science research.</p> <p>We continued to increase our R&amp;D efficiency by focusing our efforts on a reduced number of potentially high-impact projects.</p>
<b>Increase penetration of value-creating solutions</b> 	<p>Our technology has been widely adopted by the most sophisticated producers in the most developed markets. However, marked differences remain in the penetration of our solutions within the industry. Consequently, there is a wider audience of customers whom we believe can benefit from them. As steel and foundry markets in developing markets become more quality focused, we have the opportunity to significantly increase our penetration of these markets through offering our value-creating solutions.</p>	<p>In 2019, we accelerated our R&amp;D efforts and launched more than ten new products in the Steel and Foundry Divisions, including the following highlights by business unit:</p> <ul style="list-style-type: none"> <li>&gt; Flow Control – new generation of ladle slide-gate plates and systems and new high-performance tundish slide-gates</li> <li>&gt; Advanced Refractories – optimised monolithic refractory formulations</li> <li>&gt; Foundry – new coating helping automotive foundries meet the quality level of the next generation of engines and a new unique feeding system technology for casting aluminium</li> </ul> <p>More than 15 new product launches are planned for 2020.</p> <p>In addition to these new product launches, we continued to work hard to introduce our existing technologies to a wider group of customers, supporting greater quality and efficiency in production.</p>
<b>Capture growth in developing markets</b> 	<p>Building on our long-standing presence in all markets, we can leverage the high growth enjoyed by our customers' industries in emerging markets, which are large consumers of steel goods and foundry castings.</p>	<p>Despite the challenging end-market environment in 2019, we continued to focus on capturing the growth in key developing markets. Underlying revenue of our Steel Division increased by 7.9% in China, continuing our track record of growth in this important country. Underlying revenue in our Foundry Division (excluding Fused Silica) increased by 4.7% in EEMEA (Eastern Europe, Middle East (including Turkey) and Africa).</p>
<b>Improve cost leadership and margins</b> 	<p>We continue to pursue our restructuring programmes throughout the Group to adapt our business and our cost base to the changing trading environment. This is central to our efforts to improve profitability. Furthermore, we have embedded the principles of lean manufacturing across all our sites, continuously focusing on quality and productivity to enable us to maintain our margins. Our global presence allows us to benefit from economies of scale and deliver excellent service from local sites.</p>	<p>During 2019, we delivered an incremental £16.4m of recurring cash savings. These savings were delivered according to plan with the exception of £1.2m due to some delays experienced in the Foundry EMEA and Advanced Refractories NAFTA restructuring projects. This is expected to be recovered in 2020.</p> <p>The restructuring programmes are predominantly focused on rationalising our manufacturing footprint, consolidating production and streamlining back office functions. During 2019, we successfully closed six plants in EMEA and two in the US, without reducing our overall production capacity, and maintaining our proximity to customers in our regional markets. We acquired two plants in the US through the CCPI acquisition, of which Blanchester has already been closed, and we opened a new Foundry facility in Mexico. The net reduction of five plants in 2019 reduces our total manufacturing footprint from 59 to 54.</p> <p>The restructuring programmes are now expected to deliver incremental recurring annual savings of £19.4m in 2020, £6.2m in 2021 and £1.9m in 2022, an increase of £3.0m in comparison with previously announced targets. This increase in recurring cash savings will be delivered at an additional one-off cash cost of £7.2m, of which £5.1m has already been charged and £2.1m will be incurred by 2021.</p>
<b>Develop our technical service offering</b> 	<p>Our customers' processes require increasing levels of engineering services to reach the demanding levels of safety, accuracy and consistency required to achieve their quality objectives. Our Steel Digital Services (Sensors &amp; Probes) business unit is focused on incubating our data capture technologies, with the other business units delivering customer access and integration with our existing product offering. In this way, our Technical Services strategy can progressively penetrate all activities of both our Steel and Foundry Divisions.</p>	<p>We continued to see good progress in our global Technical Services offering during 2019. Our mechatronic activity is developing rapidly and during 2019 we gained our first customer in China. We now have nine active projects and our mechatronics technology centre in Belgium is being expanded to respond to the growing demand. At the same time, we have registered an increased interest globally in laser measurements, which allow customers to track the wear profile of the refractories in use to enable targeted repair, delaying the need for costly full replacements. In 2019, we sold more than 20 lasers, half of which were bought by customers located in Asia.</p>

## Our external environment

# Solutions for the changing demands of business

## Climate change and the Vesuvius proposition

### Steel



Two thirds of Vesuvius' revenue comes from providing goods and services to the steel industry.

Steel production is a highly energy-intensive process. The World Steel Association estimates that the steel industry generates between 7% and 9% of direct emissions from the global use of fossil fuel. However, steel plays an integral part in the modern world and will remain crucial for many end products. It is infinitely recyclable and the by-products created during steelmaking, along with the waste energies, are valuable resources. Vesuvius' consumables enable our customers to increase manufacturing throughput whilst lowering energy consumption. For several decades, Vesuvius' products have been assisting the steel industry in reducing greenhouse gas emissions by increasing yields and end-product consistency, therefore improving the energy efficiency of production.

### Foundry



The remaining one third of Vesuvius' revenue is generated from the provision of products and solutions to the foundry industry.

Foundries consume large amounts of energy heating metals, this being the primary driver of their impact on CO<sub>2</sub> emissions, generating significant amounts of CO<sub>2</sub>. Vesuvius' feeding systems, filters, coatings, crucibles and other products have all been developed to save energy and help foundries increase the ratio of metal contained in their finished castings to the amount of metal melted. For the past 80 years, Vesuvius' products have been helping our Foundry customers to maximise their energy efficiency and minimise wastage, increasing the ratio of metal melted to finished end castings.

### The future

- > The pressure on the steel and foundry industries to reduce GHG emissions, particularly CO<sub>2</sub>, is expected to increase significantly, with energy price increases used to compel change.
- > Our customers will continue to focus on reducing absolute energy consumption and CO<sub>2</sub> emissions (through the elimination of higher emission processes) and reducing normalised energy consumption and CO<sub>2</sub> emissions (via increased efficiency).
- > There will be an increased demand to provide thinner lighter net shape castings and higher-quality steels that can be used in thinner, lighter-weight products.
- > There will be a shift to recycling over virgin metals production to reduce GHG emissions. For the steel industry, this will result in a shift to electric arc furnaces away from blast furnaces.
- > The foundry industry will be faced with a shift away from the manufacture of internal combustion engines as the move to electric vehicles and low-carbon forms of transport accelerates.
- > In construction, lighter-weight steel and glass will replace concrete.

### How Vesuvius will respond

Vesuvius' application engineers and marketing teams are already working closely with our customers to develop new products and technologies to meet the challenges that lie ahead.



Our Foundry Division teams are developing new filtration, feeding, mould coating and molten metal treatment products to support the manufacture of lighter weight, higher-performance metals and components.



Our Steel Division engineers are working on the development of specialist fluxes and metal treatment additives to improve melting yield and deliver enhanced as-cast properties.

## Technical upgrade of steel and foundry

**+9%**

Our internal annual growth forecast for high-technology steel in India

### What's happening

Steel producers are increasingly focusing on higher-quality steel grades where the consistency of the finished steel is fundamental. As a result, there is above-market growth forecast for high technology steel in all regions although, by exception, the 'high technology' segment of the market suffered in 2019 proportionately more than the more commoditised construction steel market, due in particular to weakness in light vehicle volumes.

Foundries are experiencing a similar development where metal quality is paramount and higher strength is demanded from thinner and lighter castings.

### How we are responding

- > Vesuvius is strongly positioned to facilitate this upgrade and benefit from its development. We have a wide product and service offering designed to support the production of high-technology steel across our broad, global customer base.
- > We continue to invest heavily in R&D to maintain our technology leadership across our products and across all regions in which we operate.
- > Vesuvius' innovative portfolio of products and services, and global footprint enable us to provide high-technology solutions to our worldwide customers.

### Improving quality with our new products



Our Foundry technology solution for ladle shrouding for steel foundries continues to have strong momentum in the market. This technology lowers steel oxidation and inclusions in the end products, significantly improving the quality of the final castings and thus their performance.

In Flow Control, we launched DuraFlex 5, a long-life ladle shroud for demanding and flexible operations. The superior design results in enhanced refractory performance results, with a longer shroud life.

## Automation – safety and efficiency

**42%**

of labour by share of hours spent is expected to be performed by machines by 2022 (as estimated by the World Economic Forum)

### What's happening

Companies face ever-increasing scrutiny to ensure that their operations and products are safe and that they are not causing harm to the environment.

New technologies, such as advancements in automation, help transform production, bringing greater flexibility and lower costs, whilst also delivering the potential to significantly improve safety performance in a plant.

Robotics help support or even substitute operators in hazardous production areas, thus lowering the safety risk and ensuring consistency of the process.

### How we are responding

- > Vesuvius has the global, in-depth capability to combine know-how in steel mills and foundries with robotic capabilities: a winning combination for superior safety performance in hazardous areas of production.
- > We provide laser technology that works reliably and consistently to assess refractory wear, allowing targeted repair for efficient and safe operation.
- > Vesuvius is investing significant resources into the scale-up of our mechatronics capabilities to maintain our leadership in Tundish and Continuous Casting robotics and to expand our automation capabilities in other emerging areas of steel mills.

### Leaving the most hazardous work to robots



Vesuvius installed fully automated robots for a large steel customer in South America to execute safety-critical activities, removing operators from a hazardous production area.

In 2019, we installed our first Tundish robot outside NAFTA. Our superior capabilities in Tundish automation have helped to convince our customers to invest in order to improve their productivity and safety performance.

## Our markets

# Steel Division

## Flow Control

Crude steel production and the above average market growth of 'high-technology steel' are drivers of Flow Control's business unit product demand

## Advanced Refractories

Crude steel production and level of activity in other high-temperature industries, such as aluminium, copper, cement, petrochemical and energy from waste, are the drivers for the Advanced Refractories business unit product demand

## Digital Services

Crude steel production and the need to increase the quality and consistency of cast steel drives demand

### 'High-technology steel'

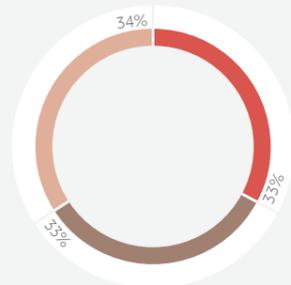
'High-technology steel' is our internal marketing segmentation that describes steel which is either high performing (e.g. high-strength steel for wind turbines) and/or where the production process to produce the steel is complex, e.g. the near net shape production process, the continuous casting process that produces steel in very thin slabs near to its final thickness.

Complex production processes and the need for higher-quality steel grades, where the consistency of the finished steel is paramount, are gaining momentum worldwide because they provide steel producers with differentiated products and significant benefits in terms of cost savings and a reduced environmental footprint.

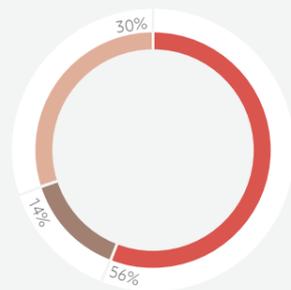
Advanced steel cans are produced from 'high-technology steel' because of the need to achieve a challenging combination of thin gauge and high rigidity/strength.



### Vesuvius' internal segmentation of global crude steel production



### Flow Control business unit end-markets



- High-technology steel**
  - > Near net shape production process
  - > Stainless steel
  - > Engineering steel: bearing, shafts, tools, etc.
  - > Automotive steel
- Medium-technology steel**
  - > Construction sheets: roofing, cladding, etc.
  - > Heavy plates for ship building, pipe
- Commodity steel**
  - > Basic rebar for concrete reinforcement

# Foundry Division

Higher sophistication and increasingly complex castings are the long-term drivers for product demand of the Foundry Division

### Foundry market end-markets

The most important end-markets for the foundry industry are general engineering, followed by light vehicles, including passenger cars and light commercial vehicles (LV's), medium and heavy commercial vehicles (MHCV), construction, agriculture and mining equipment, power generation equipment and railroad.

In 2019, Foundry end-markets faced significant challenges globally. In 2020, global medium and heavy commercial vehicle production is expected to drop by more than 8% whilst light vehicle production is likely to stabilise at low 2019 levels – only returning to positive growth in 2021. The production of agricultural equipment is expected to decline in the US and remain flat in other regions. The broad

segment of general engineering is expected to see flat markets outside China.

### Above average market growth for highly sophisticated and complex castings

The Foundry Division benefits from its capabilities to improve highly sophisticated and complex castings, which are the segments of the foundry market growing the fastest. Foundry customers are evolving towards these more sophisticated and increasingly complex castings because of increased requirements for cleaner metal to deliver complex shapes with thinner sections.

Whilst Foundry Division products typically represent less than 5% of a foundry's production costs, they contribute

### Crude steel production is a structurally growing market

According to the World Steel Association, global crude steel production in 2019 increased by 3.4% compared with 2018. However, global steel production excluding China declined by 1.7%. On a regional basis, crude steel production contracted in all regions except in Asia and the Middle East.

In the past 20 years, the growth in crude steel production came mostly from China. We do not forecast China to continue to grow at the same rate as it has done historically. In our internal projections, we forecast China to grow at a rate of 0.5% per annum.

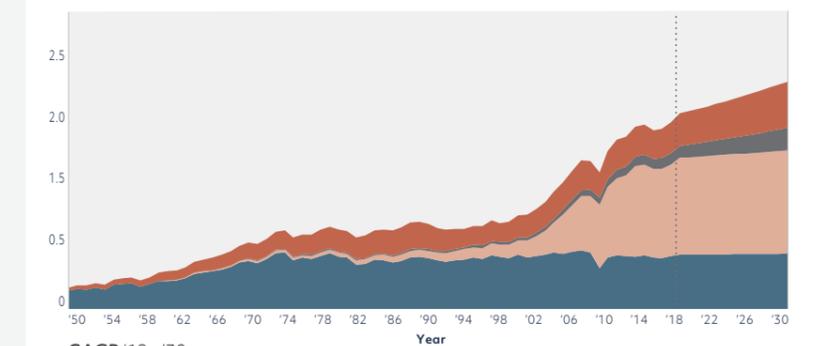
We believe that the majority of the growth in crude steel production going forward will come from India and other emerging markets, mostly the Middle East, Africa, South East Asia and Latin America.

Globally we expect crude steel production to grow at a rate of 1.3% per annum and the world excluding China at a rate of 2.0%.

#### Notes to charts, right:

- CIS, Middle East (incl. Turkey), Africa, Latin America and South East Asia.
- EU27, UK, USA, Canada and North Asia.
- Eastern Europe, Middle East (incl. Turkey) and Africa.
- Including estimates of other countries that only report annually.

### World crude steel production (mt)



CAGR '18 - '30

**+2.9%**  
Other emerging markets<sup>1</sup>

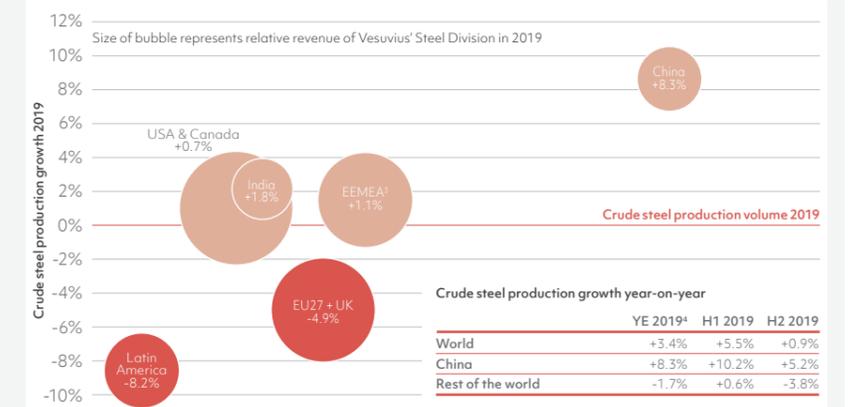
**+5.6%**  
India

**+0.5%**  
China

**+0.2%**  
Developed markets<sup>2</sup>

Sources: Historical data from World Steel Association. Forecasts are management estimates.

### Challenging environment in the steel markets outside China



	YE 2019 <sup>1</sup>	H1 2019	H2 2019
World	+3.4%	+5.5%	+0.9%
China	+8.3%	+10.2%	+5.2%
Rest of the world	-1.7%	+0.6%	-3.8%

significantly to the improvement of product quality and manufacturing efficiency, whilst reducing the environmental impact of the casting process and improving the ratio of finished castings to the amount of metal poured, which is a key parameter for foundry efficiency.

### Technology changes and environmental drivers

New technologies, such as 3D printing, are expected to continue to influence the metal casting industry, allowing for faster prototyping and production of smaller volume parts. Environmental regulations, driven by the desire to reduce volatile organic compound emissions and the use of silica within the industry, are also expected to continue to tighten. This will drive the trend to find processes and

consumable products which support production efficiency and reduce a foundry's impact on the environment.

### Iron casting

Iron casting is split between grey and ductile iron, with grey iron representing the majority of metal being cast. This is a cost-efficient and robust process producing components that do not need to tolerate extreme mechanical stress. All iron castings require filters and coatings, but grey iron is not as reliant on feeding system utilisation due to its lower shrinkage on solidification. Conversely, ductile iron production requires more sophisticated consumable products to cope with the high shrinkages of metal whilst solidifying.

### Steel casting

Steel is used in casting for manufacturing components with very high mechanical performance. Steel casting is the most demanding casting process due to higher melting temperatures and greater tendency for shrinkage. This drives greater demand for products and technical expertise in this segment.

### Aluminium/Non-ferrous casting

Aluminium casting is the segment of the foundry market growing the fastest. It has captured a significant share of the light vehicle market. Being molten below 700°C, aluminium can be cast in iron moulds which can then be reused. Vesuvius concentrates on supplying fluxes, filters and machines that refine the composition and cleanliness of the metal.

## Business model

# A profitable, flexible, cash-generative model focused on sustainable growth

## What we do

We develop and manufacture high-technology products and solutions predominantly for supply to the steel and foundry casting industries, operating a profitable, flexible, cash-generative and growth-building business model. Over many years, we have built the brand equity of our Vesuvius and FOSECO products through technology leadership, reliability and service.

## Our key resources

### Financial capital

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

### Manufacturing capital

We have a global footprint, with 54 production sites on six continents, giving us proximity to our customers.

### Intellectual capital

We have six R&D centres of excellence with dedicated R&D staff worldwide, generating innovative products and solutions for our customers.

6

R&amp;D centres of excellence

10,496

Employees

54

Production sites

### Human capital

We invest in developing our skilled and motivated workforce of 10,000 people and provide them with a safe environment in which to work.

### Social capital

We champion our values and our ethical conduct. We maintain strong relationships with customers and our wider stakeholder groups.

### Natural capital

We utilise high-quality raw materials, secured through reliable and well-developed and sustainable supply chains.

## How we deliver

- > Our industry experts are embedded at many customer locations and are therefore ideally placed to collaborate with customers to identify their needs, and potential service and process improvements. This also enables us to grow our solutions and service portfolio.
- > We develop high-technology products that deliver quality enhancement, efficiency gains and energy savings to our customers. We focus on sustainability in our own business through the efficient use of energy and natural resources.
- > Our model is profitable by allowing value pricing for bespoke products and services. It generates growth as we enlarge our market with additional innovative products and solutions.
- > Our model is resilient to end-market volatility due to the flexibility of our diversified manufacturing footprint and adjustable cost base.
- > Our commitment to ethical business delivers strong, long-term, sustainable commercial relationships.

## The value we create

### Our investors

Our efficient use of capital generates annual profits, giving returns to our shareholders and underpinning sustainable growth.

### Our customers

Our investment in innovation creates cutting-edge products and solutions, delivering enhanced value for our customers and differentiating us from our competitors. We embed technical experts within our customers, giving us a fundamental understanding of their needs and delivering them access to our global network of highly skilled individuals.

### Our people

We focus on the health and safety of all our staff. We engage with our people, encouraging and rewarding high performance to create an environment where all can realise their individual potential.

### Our suppliers

Maintaining cost-effective access to high-quality raw materials is vital to our success. Our suppliers are critical to our business.

### Our 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.

### Students and graduates

Attracting new talent to Vesuvius is vital for the Group's continuing success. Recruiting new students and graduates feeds the talent pipeline and allows us to tap into new sources of up-to-date business ideas and R&D capability.

## Our sustainable competitive advantages

### Global presence

Using our global expertise to identify and create market opportunities

Vesuvius is present on six continents, supporting the development of global steel and foundry manufacturing processes with new technologies.

We have manufacturing capability in all the main steel and foundry markets and hire and train local engineers. Our local manufacturing, local expertise and global knowledge of customers' processes give us a special relationship with our customers.



See more about **Our global presence** on p4-5

### Optimised manufacturing

Low-cost lean manufacturing provides reliable 'just-in-time' products

Our successfully tested products can be produced at high volumes across all of our manufacturing footprint, guaranteeing cost-competitive and time-efficient delivery. We optimise our cost-competitiveness by investing in low-cost production sites and increasing production automation – and have established manufacturing facilities to support our expansion in emerging markets.



See more about **Our operations** on p44-51

### Advanced technology

Our technology centres develop value-adding solutions involving engineered systems and high-value consumables

Our continuing investment in Vesuvius' R&D centres of excellence is reflected in all areas of our offering. We have knowledge of the most advanced ceramic and metallurgical techniques using state-of-the-art equipment and the most advanced technologies of flow simulation and finite element analysis. We are therefore able to provide our customers with sophisticated, innovative, custom-designed solutions.



Read more about our **Value-added solutions** on p14 and 15

### Service and consistency

Serving our customers reliably, competitively and consistently with consumables critical for their manufacturing processes

Alongside our global presence, we ensure a local service to our customers, from inventory management to high-quality technical support at their sites and the ability to swiftly modify production and supply to reflect changes in customer requirements. Our knowledge of end-market processes, specifications and techniques around the world gives our experts an unparalleled ability to support our customers.



Read more about **Our Operations** on p44-51

## Section 172(1) Statement

# Effective engagement with stakeholders promotes the long-term sustainability of the Group

Under Section 172 of the Companies Act 2006, the Directors have a duty to promote the success of the Company over the long term for the benefit of shareholders as a whole, having regard to a range of other key stakeholders and interests. The Directors must have regard (amongst other matters) to the:

### Likely consequences of any decision in the long term

### Interests of the Company's employees

### Need to foster the Company's business relationships with suppliers, customers and others

### Impact of the Company's operations on the community and the environment

### Desirability of the Company maintaining a reputation for high standards of business conduct

### Need to act fairly as between members of the Company

The Board is responsible for the overall direction of the Group. It focuses primarily upon strategic and policy issues and is responsible for the Group's long-term success. It sets the Group's strategy, oversees the allocation of resources and monitors the performance of the Group, to ensure that the Group is structured appropriately for the challenges and opportunities of the future. In performance of these duties, the Board is focused on the sustainability of the Group in the long term. The Board recognises the need for the Group to have effective engagement with, and encourage participation from, all key stakeholders to promote these long-term interests. The Group's key stakeholder groups, reflecting those who have the biggest impact on the business and modes of engagement, are outlined in the table on pages 26 and 27. The Board has regard to the activities undertaken throughout the Group in considering its own Section 172 responsibilities.

### Likely consequences of any decision in the long term

Throughout the year, the Board considered the long-term consequences of the decisions it made, focusing on the interests of relevant stakeholders as appropriate. Examples of the activities the Board undertook during 2019 to meet its obligations under Section 172 include the following:

- > The Board oversaw the Group's restructuring plans to maximise operating efficiency. In doing so, it was cognisant of the impact these decisions would have on affected employees and communities. The Board also considered the likely impact of these plans on the Group's customers, with alternative sourcing identified where necessary, and actions taken to mitigate any disruption in supply.
- > The Board supported the setting of new environmental targets for the Group – expanding its range of activity to seek to lessen the impact of the Group's operations on the environment. More information can be found in the Sustainability section on pages 64-67.
- > The Board considered its Section 172 responsibilities in respect of the continued progression of the Group's strategy and its 2020 Budget proposals, including the likely long-term consequences of the decisions being taken in respect of the future footprint of the Group. The impact that any further restructuring would have on the Group's workforce, suppliers and customers was reflected in the outcome of discussions.
- > The Board reviewed an updated HR strategy identifying continuing developments in talent management to support the longer-term succession planning that underpins delivery of the Group's strategy.

### Interests of the Company's employees

- > During 2019, the Company undertook its inaugural global employee engagement exercise. The Board oversaw this process, which commenced with an engagement survey, aimed at canvassing the opinions of all of our >10,000 employees worldwide. The Board received feedback on the results and considered what this indicated about the culture of the Group. It reviewed management's response to the outcome of the survey and the follow-up actions being undertaken throughout the Group. Further information about the survey can be found on page 69.
- > The Board also reviewed the new initiatives that are being implemented to enhance the career and personal development of employees. As part of the regular schedule of business unit presentations, the Board reviewed the specific HR objectives for each business unit.
- > The Board approved a new Drugs and Alcohol Policy, considered at each Board meeting the Group's performance against the Health and Safety KPIs and reviewed, in detail, the circumstances of any Lost Time Incidents that had been recorded since its last meeting.
- > The Board also approved new Core Safety rules underpinning its commitment to ensure the safety of the Group's employees. Further information on Safety can be found on pages 58-63.
- > Further information about the work of the Board's Committees in considering and supporting the interests of the Company's employees can be found in the Nomination and Remuneration Committee Reports on pages 97-125.

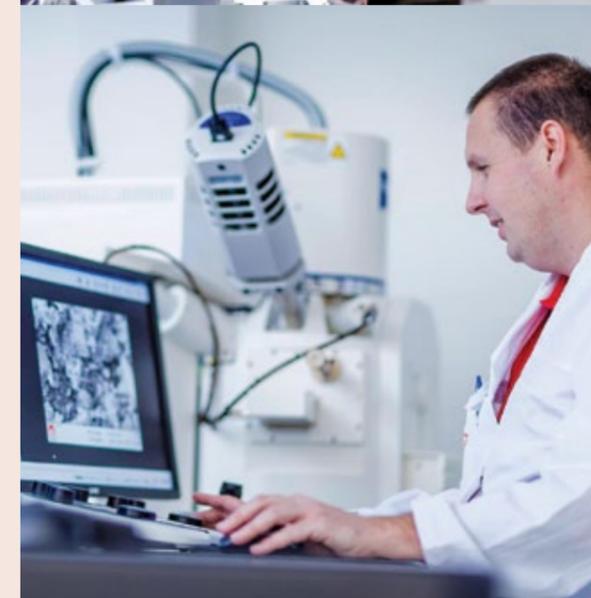
### Employee involvement

Vesuvius adopts an open and honest approach to employee communications, with regular updates from senior management across businesses and operations within the Group. The Board and Group Executive Committee visit operations throughout the year, touring the sites, meeting with employees and conducting 'town hall' meetings when they do. Other regular communications include direct email updates on the financial performance of the Company, the industrial environment in which Vesuvius operates and other significant operational developments. The Company operates an employee intranet which distributes Company news and events, an employee 'app' for information dissemination, as well as local initiatives for employee engagement on a site-by-site basis.

The HR department is the primary point of contact for employees on employment and workplace matters, operating with an open-door policy and advising employees of any local legal, tax, pension or

other employment changes. There are numerous employee-sponsored and led representative bodies within Vesuvius which differ with respect to jurisdiction and geography. Senior management, supported and facilitated by the HR department, encourages open dialogue and consults with these employee representative bodies as appropriate.

All members of the Group Executive Committee participate in the Vesuvius Share Plan and receive awards of Performance Shares, which vest in accordance with measures and targets set against EPS and TSR. For certain senior managers, awards are made under the Vesuvius Medium Term Plan (MTP). These managers participate in the MTP at varying percentage levels, and awards are made in shares and based on the same measures and targets as the Annual Incentive Plan. In this way, a broad cadre of management has incentives that are aligned with shareholders.



### Employee engagement

The new UK Corporate Governance Code requires that companies use one or a combination of the following methods, for engagement with their workforce:

- > a director appointed from the workforce
- > a formal workforce advisory panel
- > a designated non-executive director

Alternatively, companies should explain what arrangements are in place and why it considers that they are effective. Vesuvius has chosen not to specifically adopt one of the three defined methods of engagement, which it believes do not fit well with the complexity of Vesuvius' operations, with four business units, employing more

than 10,000 people located in 41 different countries. The Group has adopted an approach that builds on existing engagement initiatives and targets specific issues for attention. These processes engage the entire Board and are overseen by Holly Koeppel, one of our independent Non-executive Directors. The Board has increased its visibility and extended the range of direct feedback it receives from employees. The primary mode of engagement for Directors during 2019 was through direct interaction with the workforce during the Directors' comprehensive range of site visits. The Board discussed and implemented new processes for these site visits, including seeking consistent and comparable information provision across sites,

and the delivery of formal and structured feedback. The Non-executive Directors undertook 23 individual site visits during the year, touring our facilities and engaging with the workforce throughout the plants, conducting round-table discussions, and attending staff social events. As part of this approach to employee engagement, in 2019, alongside reviewing the results of the Employee Engagement survey, the Board also considered a number of key workforce related issues gathered from these visits and the other employee feedback mechanisms operated by the Company.

The feedback from these processes has informed management actions at site and Group level.

## Section 172(1) Statement continued

**Need to foster the Company's business relationships with suppliers, customers and others**

- > During 2019, the Board received presentations from the business unit Presidents and President Operations & Technology on relationships with customers and key matters of concern to them. The Board reviewed information on the Group's performance against key quality targets each month and was updated at Board meetings on actions undertaken to rectify any significant quality issues or customer complaints. The Board considered market trends at each meeting, and undertook a more thorough review of macro-trends and their likely long-term implications at the annual Strategy meeting.
- > Alongside the regular customer visits undertaken by the Executive Directors, individual Non-executive Directors visited customers in South Korea and the Czech Republic, with the full Board visiting a steel customer in the USA in September. Each visit provided the Directors with the opportunity to speak directly to our customers about their businesses and to hear from them first hand about their immediate challenges, and longer-term expectations.
- > The Board also received a series of presentations from Vesuvius' new Group Head of Procurement on the Group's relationships with its suppliers and its purchasing practices.

**Impact of the Company's operations on the community and the environment**

- > In 2019, the Board received presentations from the VP HSE and Quality detailing the Group's activities with regard to sustainability. The Board considered the action being taken in the Group to reduce water and material wastage, to conserve energy and to utilise recycled materials. Further details of the Board's oversight of the Group's sustainability activities can be found in the Sustainability section on pages 64-67.
- > The Board recognises that the success of the Group's operations are dependent on maintaining positive relations with the communities in which they operate. The Board encourages Vesuvius' sites to support their local communities through charitable activities and community events. During the year, the Chairman visited the Indian Institute of Cerebral Palsy (IICP), a registered charity which has, for the past four decades, provided training and rehabilitation to children of all ages and adults with cerebral palsy. Vesuvius India Limited sponsors two classes at the IICP and has supported this organisation since 2015. Further examples of the Group's community activities can be found in the Community section on pages 68-73.

**Desirability of the Company maintaining a reputation for high standards of business conduct**

- > The Group's Code of Conduct states that Vesuvius must maintain an unquestioned reputation for integrity. The Board takes seriously the Group's obligation to maintain high standards of business conduct and assessed compliance with this requirement through a variety of mechanisms during 2019, including reports from Internal and External Audit, along with feedback from the Group's Employee Engagement survey. During site visits, the Directors also had the chance to assess the conduct of our workforce on the ground, and the observation of the Group's CORE Values.
- > Vesuvius agrees terms with its suppliers and seeks to pay in accordance with those terms.
- > When reviewing the Group's tax strategy, the Board considered the Group's approach to tax management in light of the need for the Company to maintain a reputation for high standards of business conduct.
- > In addition, the Board received formal reports during 2019 on the Group's compliance activities, including the Group's risk assessment programme and training practices, and specific feedback on the Group's Speak Up helpline. Further details of the Group's compliance activities can be found in the Our principles section on pages 54-57.

**Relations with shareholders**

The Board is committed to communicating with shareholders and other stakeholders in a clear and open manner and seeks to ensure effective engagement through the Company's regular communications, the AGM and other investor relations activities. The Company undertakes an ongoing programme of meetings with investors, which is managed by the Investor Relations team. The majority of meetings with investors are led by the Chief Executive and Chief Financial Officer.

In advance of each AGM, we write to our largest shareholders inviting discussion on any questions they might like to raise and making the Chairmen of the Board, the Audit Committee and the Remuneration Committee available to meet shareholders should they so wish. In 2019 and 2020, we engaged with shareholders on the Group's

remuneration proposals, further details of which can be found in the Directors' Remuneration Report on page 125.

The Company reports its financial results to shareholders twice a year, with the publication of its annual and half-year financial reports. In addition, to maintain transparency in performance, we also issued two trading updates during 2019. Presentations or teleconference calls were held by the Chief Executive and Chief Financial Officer with institutional investors and analysts on each of these dates.

All Directors attend the Company's AGM, providing shareholders with the opportunity to question them about issues relating to the Group, either during the meeting or informally afterwards.

**Need to act fairly as between members of the Company**

- > The primary focus of the Board's business decisions is on ensuring the long-term sustainability of the Group. 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.
- > In taking capital allocation decisions during 2019, the Board was cognisant of the need to balance the interests of different stakeholders. Decisions on the Group's approach to working capital, investment opportunities, capex, R&D, investment in people, dividend policy and pension contributions, taken during the year, were all considered against this backdrop.

# We are Chemists Researchers Physicists Engineers



**Jianming Xue**  
Canning Operator for BY line  
Suzhou, China

## Section 172(1) Statement continued

## Our stakeholders

Why we engage	Types of engagement undertaken	Issues relevant to the stakeholder group
<p><b>Our people</b></p> <p>The dedication and professionalism of our people, their capacity for owning 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 engage with our people, encouraging and rewarding high performance to create an environment where all can realise their individual potential.</p>	<p>Fundamental focus on health and safety and the care and preservation of all employees</p> <p>Continuing dialogue between employees and their managers, including the conduct of regular performance reviews</p> <p>Competitive remuneration and benefits strategy, emphasising talent development with tailored career-stage programmes. Living the Values and other award schemes celebrate individuals' achievements</p> <p>Global communication mechanisms include an internal intranet, global email communications and a Vesuvius app, alongside less formal forums such as local 'Town Hall' meetings. The Group operates a European Works Council, local works councils and recognises trade unions</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>Many businesses operate family days, when the facility is open to friends and family</p>	<p>Personal development</p> <p>Remuneration evolution</p> <p>International mobility</p> <p>Employee engagement</p> <p>Development and retention</p> <p>Career opportunities</p> <p>Health and safety</p> <p>Diversity and inclusion</p> <p>Environmental performance</p>
<p><b>Students and graduates</b></p> <p>Attracting new talent to Vesuvius is vital. Recruiting new students and graduates feeds the talent pipeline and allows us to tap into new sources of up-to-date business ideas and R&amp;D capability.</p>	<p>The Group maintains contact with universities and R&amp;D collaborations to identify and develop talent and complement our in-house R&amp;D capability</p> <p>Our businesses attend careers fairs and provide student work placements and internships</p> <p>Vesuvius' website provides prospective applicants with detailed information about the Group</p>	<p>Career opportunities, personal development, engagement and retention</p> <p>Research and innovation</p> <p>Training and mobility</p>
<p><b>Customers</b></p> <p>Engaging with our customers helps us to understand their needs and identify opportunities and challenges. Collaborating with our customers enables us to use our expertise to improve the safety and efficiency of their manufacturing processes, enhance their end-product quality and reduce their costs.</p>	<p>Senior-level dialogue is maintained with all key customers, including Directors' visits to customers' sites</p> <p>Our business model focuses on collaboration with customers, to provide customised solutions, and more than 2,500 Vesuvius representatives are embedded at customer locations</p> <p>The Group manages customer relationships on a global basis as required, complemented by diverse local servicing capability</p> <p>We engage with customers on safety leadership and support their training requirements</p> <p>We provide customer training, including the Fosco University, and participate in industry forums and events</p>	<p>Customer satisfaction</p> <p>Product performance and efficiency</p> <p>Innovation and provision of solutions</p> <p>Health and safety</p> <p>Sustainability performance</p>
<p><b>Suppliers and contractors</b></p> <p>Maintaining a flexible workforce through the use of contractors and cost-effective access to high-quality raw materials is vital to our success. Our contractors and suppliers are critical to our business.</p>	<p>Vesuvius conducts regular visits to key suppliers</p> <p>Senior-level relationships are built with large suppliers</p> <p>All suppliers/brokers have regular interaction with the Global Purchasing Team</p> <p>Dedicated category directors build long-term relationships and product expertise</p> <p>There is a rigorous and consistent supplier accreditation procedure</p> <p>Effective working protocols, including work risk assessments, are established with contractors</p>	<p>Operational performance</p> <p>Responsible procurement</p> <p>Trust and ethics</p> <p>Payment practices</p>
<p><b>Investors</b></p> <p>Continued access to funding is vital to the performance of our business. We work to ensure that our investors have a clear understanding of our strategy, performance and objectives.</p> <p>Supportive investors are more likely to provide the Company with funds for expansion.</p>	<p>Vesuvius' Investor Relations Strategy managed by the Group Finance Director and Chief Executive includes regular meetings with key and prospective investors</p> <p>The Group's Annual Report provides an overview of the Group and regular announcements and press releases are published to provide updates on the Group's performance and progress</p> <p>The AGM provides all shareholders with an opportunity to directly engage with the Board</p> <p>There is ongoing dialogue with the Company's analysts to address enquiries and promote the business</p>	<p>Financial performance</p> <p>Strong governance and transparency</p> <p>Environmental performance</p> <p>Diversity and inclusion</p> <p>Director remuneration</p> <p>Board performance</p>

Why we engage	Types of engagement undertaken	Issues relevant to the stakeholder group
<p><b>Lenders (Banks and debt investors)</b></p> <p>The Group needs to access funding to ensure it has sufficient financing to run the business and fund future growth. We ensure that our relationship banks have a clear understanding of our strategy, performance and objectives. We engage with lenders to fulfil our compliance obligations and to ensure that we have clear knowledge and awareness of market sensitivities and trends.</p>	<p>Group Treasury maintains an ongoing dialogue with key lenders through the relationship banks and other local banks in the countries in which Vesuvius operates</p> <p>The Group Treasurer, Group Head of Corporate Finance and CFO hold regular meetings with key personnel from the banks who provide the Group's debt funding</p> <p>Representatives from the banks are invited to the Group's results presentations</p>	<p>Financial performance</p> <p>Group internal control and audit processes</p> <p>Strategic planning and ability to repay debt</p> <p>Gearing and monitoring of financial covenant ratios</p> <p>Business continuity planning</p> <p>Transparency/ethical behaviour</p>
<p><b>Communities</b></p> <p>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.</p>	<p>Provision of work experience and internships to local university and school children</p> <p>Sponsoring of charitable activities</p> <p>Participation in local volunteering initiatives</p>	<p>Operational performance</p> <p>Transparency/ethical behaviour</p>
<p><b>Environmental agencies and organisations</b></p> <p>Good environmental management is aligned with our focus on cost optimisation and operational excellence. We engage with appropriate organisations to ensure that we are complying with regulatory requirements, and to publicise our performance.</p>	<p>Visits and inspection of sites by government agencies</p> <p>Annual Report and Financial Statements</p> <p>Response to environmental research as part of customer and supplier due diligence</p> <p>Participation in environmental and social responsibility research and questionnaires</p>	<p>Governance and transparency</p> <p>Operational performance</p>
<p><b>Governments and regulatory agencies</b></p> <p>National governments set the regulatory framework within which we operate. We engage where appropriate to ensure that we can help in shaping new policies, regulations and standards, and ensure compliance with existing requirements.</p>	<p>Transparent communication with government officials as required</p> <p>Participation in appropriate government and industry working groups</p> <p>Membership of industry associations and contribution to best practice guidance</p> <p>Lobbying and direct contact with appropriate bodies on key business issues</p>	<p>Trust and ethics</p> <p>Governance and transparency</p>
<p><b>Pensioners and deferred pensioners</b></p> <p>Providing for and managing future pension liabilities in our defined benefit schemes is an important part of our financial planning.</p>	<p>Ongoing contact with members of the Group's pension plans, including annual member updates and contact on specific regulatory developments</p> <p>Regular contact with the trustees and custodians of the Group's benefit plans, as appropriate</p>	<p>Financial performance</p>

## Risk, viability and going concern

# The Board continually monitors the internal and external risks that could significantly impact the Group's long-term performance

The Group undertakes a continuous process to review and understand existing and emerging risks.

### Risk management in 2019

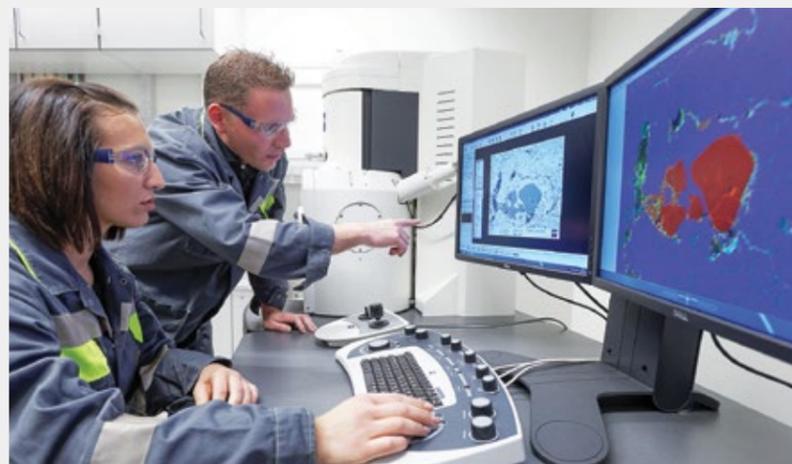
The Board's oversight of principal risks involves a specific review of the processes by which the Group manages those risks. This establishes a clear understanding at Board level of the individuals and groups within the business formally responsible for the management of specific risks and the mitigation in place to address them. The Board also establishes the Group's risk appetite, considering the nature and extent of the principal risks that the Group should take and the associated adequacy of the steps being taken to mitigate them.

The Board has 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 of risk identification and review, which includes a formal process, conducted annually for mapping risks from the bottom up, with each major business unit and key operational, senior functional and senior management staff identifying their principal risks. This assessment undergoes a formal review at half-year. The results are compiled centrally to deliver a coordinated picture of the key operational risks identified by the business. These are further reviewed by the Group Executive Committee. In conjunction with this process, each Director contributes their individual views of top-down strategic risks

facing the Group – drawing on the broad commercial and financial experience gained both inside and outside the Group. The results of this assessment are then overlaid on the internal assessment of risks to build a comprehensive analysis of existing and emerging risk. This review process extends to cover 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 society more generally. As in previous years, in 2019 the Group's assessment of principal risks was also reviewed and considered against this group of emerging risks and uncertainties identified through our Board review process.

### Changes to risk in 2019

During 2019, the Board continued to focus on specific, identifiable risks where those arose during the year – the challenges of the global economic situation, particularly the slowdown in our underlying markets, the supply of quality raw materials and the potentially disruptive effects on global trade from increasing geopolitical tensions – which we note in the table of Principal risks and uncertainties. End-market risks, protectionism and globalisation, and the changing regulatory environment were identified as key areas for attention and mitigation.



As issues of climate change climb up the global agenda, the Board has examined how this may affect our internal processes and our external environment – understanding both the drivers of sustainability at our customers and focusing on increased analysis of our operating performance.

As a result, the Board resolved to identify ESG risks as a separate element of the Group risk register – recognising the work Vesuvius can do to mitigate the pressure our end-customers experience to drive energy efficiency and reduce their carbon footprint, together with the need to focus internally on the action the Group can take to drive business sustainability. This risk also encompasses social and governance issues that were already incorporated into the Group's risk analysis.

In addition, the Board continues to monitor the implications of certain other emerging 'macro' trends such as automation in manufacturing and increasing digitalisation, both of which could act as disruptors to industry. Some commentary on these areas is contained in the Our external environment section on pages 16 and 17 of this Report. This Report also sets out, on page 23, the work done in 2019 to engage with the workforce, and to ensure that Vesuvius fosters an appropriate culture and that Vesuvius' values are embedded throughout the Group, reflecting the Board's recognition of the challenges that could arise from a failure by the Group to support the retention of appropriate talent and to foster the correct culture for success.

The Board has discussed the potential impact of Covid-19 on the business, and in particular the actions being taken to respond given the Group's operations in China. This remains a matter of close attention for the Board.

Finally, the Board continued to monitor the developing issues posed by cyber threats. Further focused work was undertaken during the year on analysing and increasing the integrity of our system security. The Board received reports from the Group's multi-disciplinary committee appointed to assess the Group's controls in this area as well as from external experts to enhance the Board's understanding of and respond to emerging cyber trends.

The Directors' views on each of the above issues, and on emerging risks in general, were independently gathered and integrated into the management discussions and actions taken on risk.

Risk remains an integrated part of all business unit presentations to the Board, informing the Board of the operational approach taken to risk management on a day-to-day basis.

### Brexit

Following the exit of the UK from the EU on 31 January 2020 under the Withdrawal Agreement, the UK is currently subject to a Transition Period which will run until the end of 2020 (unless extended). During the Transition Period, the UK remains in the Single Market and the Customs Union of the EU whilst the terms of a new trade agreement are negotiated. If those negotiations are not completed and ratified before the end of the Transition Period, World Trade Organization rules may apply.

Vesuvius has analysed the potential challenges posed by Brexit, including the possibility of a 'no trade deal' situation occurring at the end of 2020, and identified mitigation strategies to address those challenges.

For our customers located in the EU27 countries, most of our products are manufactured by Vesuvius outside the UK, so we would not envisage a material impact from Brexit after the Transition Period. For those customers located in the UK or located in the EU27 and supplied from our UK plant, we have contingency plans and we are working with these customers to meet their needs in a cost-efficient way.

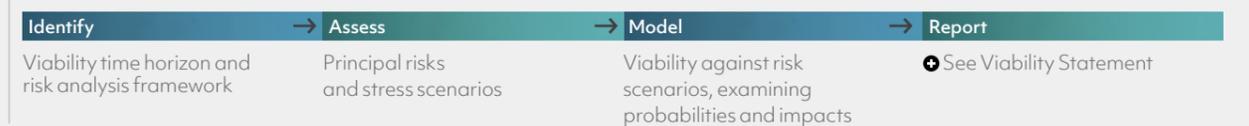
### Risk mitigation

The risks identified are actively managed in order to mitigate exposure. Senior management 'owners' are identified for each principal risk to manage the mitigations of that specific risk and contribute to the analysis of its likelihood and materiality. This is reported to the Board. The risks are analysed in the context of our business structure which gives protection against a number of principal risks we face with diversified currencies, a widespread customer base, local production matching the diversity of our markets and intensive training of our employees. Additionally, we seek to mitigate risk through contractual measures. Where cost-effective, the risk is transferred to insurers.

### Business continuity

In partnership with our risk management advisers and our insurers, we seek to identify the most effective means of reducing or eliminating insurable risks, through a combination of risk management and the placing of insurance cover.

### Viability process



## Risk, viability and going concern continued

Our Insurer Property Loss Control Programme is based upon insurer loss modelling and focuses on insured losses. The insurer's loss control engineers undertake a series of on-site inspections focused on machinery breakdown, fire, natural catastrophe and other property damage and business interruption risks. These surveys yield a series of loss reduction recommendations. The execution of these recommendations is agreed with site management and then followed through to completion.

In parallel, Vesuvius' own loss management programme focuses on strategic sites and sites not covered by insurers. Assisted by an independent consultant, we undertake property loss control and business continuity surveys using Vesuvius' bespoke risk and exposure-based protocol.

These reports yield further risk reduction recommendations, and improvement actions and timescales are agreed and followed through by site management. To support the Group's loss control activities, risk management workshops are conducted covering loss prevention, emergency planning, crisis management and business recovery.

With regard to fire safety, the Group monitors all fire-related near misses or minor dangerous occurrences. Any fires, including overheating, are reported and analysed locally and by senior HSE management in order that safety improvement initiatives can be prioritised. Underlying causes are established with detailed analysis undertaken as a means of proposing improvement priorities in order that safety and process safety initiatives can be targeted on a risk-assessed basis.

### Internal control

The Group's internal control system is designed to manage, rather than eliminate, the financial risks facing the Group and safeguard its assets. No system of internal control can provide absolute assurance against material misstatement or loss. The Group's system is designed to provide the Directors with reasonable assurance that problems are identified on a timely basis and are dealt with appropriately.

The Audit Committee assists the Board in reviewing the effectiveness of the Group's system of internal control, including financial, operational and compliance controls, and risk management systems. The key features of the Group's system of internal control are set out in the table below.

### Key features of risk management and internal control

<b>Strategy and financial reporting</b>	<ul style="list-style-type: none"> <li>&gt; Comprehensive strategic planning and forecasting process</li> <li>&gt; Annual budget approved by the Board</li> <li>&gt; Monthly operating financial information reported against budget</li> <li>&gt; Key trends and variances analysed and action taken as appropriate</li> </ul>
<b>Vesuvius GAAP</b>	<ul style="list-style-type: none"> <li>&gt; Accounting policies and procedures formulated and disseminated to all Group operations</li> <li>&gt; Covers the application of accounting standards, the maintenance of accounting records and key financial control procedures</li> </ul>
<b>Operational controls</b>	<ul style="list-style-type: none"> <li>&gt; Operating companies and corporate offices maintain internal controls and procedures appropriate to their structure and business environment</li> <li>&gt; Compliance with Group policies on items such as authorisation of capital expenditure, treasury transactions, the management of intellectual property and legal/regulatory issues</li> <li>&gt; Use of common accounting policies and procedures and financial reporting software used in financial reporting and consolidation</li> <li>&gt; Significant financing and investment decisions reserved to the Board</li> <li>&gt; Monitoring of policy and control mechanisms for managing treasury risk by the Board</li> </ul>
<b>Risk assessment and management</b>	<ul style="list-style-type: none"> <li>&gt; Continuous process for identifying, evaluating and managing any significant risks</li> <li>&gt; Risk management process designed to identify the key risks facing each business</li> <li>&gt; Reports made to the Board on how those risks are managed</li> <li>&gt; Each major Group business unit produces a risk map to identify key risks, assess the likelihood of risks occurring, as well as their impact and mitigating actions</li> <li>&gt; Top-down risk identification undertaken at Group Executive Committee and Board meetings</li> <li>&gt; Board review of insurance and other measures used in managing risks across the Group</li> <li>&gt; The Board is notified of major issues and makes an annual assessment of how risks have changed</li> <li>&gt; Ongoing assurance processes by the legal function and Internal Audit including the annual certification process</li> <li>&gt; Externally supported 'Speak Up' whistleblowing line</li> </ul>
<b>Internal Audit</b>	<ul style="list-style-type: none"> <li>&gt; Reviews Vesuvius' businesses and reports on the adequacy and effectiveness of their systems of internal control and compliance with Group policies and procedures</li> <li>&gt; Agrees action plans for the resolution of any improvement actions identified by their audits and monitors with local management and the business unit Presidents progression with their completion</li> <li>&gt; Reports to the Audit Committee on the results of each audit and provides regular updates on high-priority action items</li> <li>&gt; The Audit Committee discusses the key risks identified by Internal Audit</li> </ul>

### Reviewing the effectiveness of risk management and internal control

The internal control system covers the Group as a whole, and is monitored and supported by the Group's Internal Audit function, which conducts reviews of Vesuvius' businesses and reports objectively both on the adequacy and effectiveness of the system of internal control and on those businesses' compliance with Group policies and procedures. The Audit Committee receives reports from the Group Head of Internal Audit and reports to the Board on the results of its review.

The Group also conducts a self-certification exercise by which senior financial, operational and functional management certify the compliance throughout the year of the areas under their responsibility with the Group's policies and procedures and highlight any material issues that have occurred during the year.

As part of the Board's process for reviewing the effectiveness of the system of internal control, it delegates certain matters to the Audit Committee.

Following the Audit Committee's review of internal financial controls and of the processes covering other controls, the Board annually evaluates the results of the internal control and risk management procedures conducted by senior management.

Since the date of this evaluation, there have been no significant changes in internal controls or other matters identified which could significantly affect them.

In accordance with the provisions of the UK Corporate Governance Code, the Directors confirm that they have carried out a robust assessment of the principal risks facing the Company, including those that threaten its business model, future performance, solvency or liquidity. They have also reviewed the effectiveness of the Group's system of internal control and confirm that the necessary actions have been taken to remedy any control weaknesses identified during the year.

Further detail regarding the Audit Committee's review of the effectiveness of the Group's risk management and internal control systems is contained in the Audit Committee report on pages 92 and 93.

### Principal risks

The risks identified on pages 32 and 33 are those the Board considers to be the most relevant to the Group in relation to their potential impact on the achievement of its strategic objectives. All of the risks set out on these pages 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. These risks are not the only ones that the Group will face. Some risks are not yet known and some currently not deemed to be material could become so.

### Viability Statement

In accordance with the UK Corporate Governance Code, the Directors have assessed the viability of the Group over a three-year period to 31 December 2022, taking into account the Group's current position and the potential impact of the principal risks and uncertainties.

The Directors have determined that three years is an appropriate period over which to provide the Viability Statement because this is the Company's planning cycle and it is sufficiently funded by financing facilities with average maturity terms of approximately four years.

In making this statement, the Directors have carried out a robust assessment of the principal risks that may threaten the business model, future performance, solvency and liquidity of the Group. This is embodied in the annual review of a three-year business plan which includes a review of sensitivity to 'business as usual' risks, such as profit growth and working capital variances, severe but plausible events and the impact these could have on the Group's debt covenants and available liquidity. The results take account of the availability and likely effectiveness of the mitigating actions that could be taken to avoid or reduce the impact or occurrence of the underlying risks.

Whilst the review has considered all the principal risks identified by the Group, the following were selected for enhanced stress testing: an unplanned drop in customer demand; debt recovery risk due to customer default; business interruption due to the unplanned closure of a key plant; and raw material price inflation. The Group's prudent balance sheet management, flexible cost base to react quickly to end-market conditions, access to long-term capital at acceptable

financing costs and well-diversified international businesses leave it well placed to manage these principal risks.

In performing the stress testing, certain assumptions were made, including that: customer failures result in write-offs of the full value of the receivables with no lost revenue replacement; and cash flow is supported by working capital releases, restricted capital expenditure and operating cost reductions. Under the enhanced stress testing described above, a potential breach of a covenant would only occur in the event of an unforeseen reduction in revenue of greater than 30%.

Accordingly, the Directors confirm that they have a reasonable expectation that the Group will be able to continue in operation and meet its liabilities as they fall due over the three-year period to 31 December 2022.

Furthermore, the Board believes that the Group continues to be well positioned for success in the longer term because of our exposure to end-markets that are growing faster than underlying global GDP; our market-leading position that is supported by ongoing investment in innovation and R&D; our strong degree of customer intimacy by virtue of around a third of our employees working at customer facilities; and the focus we have on building quality teams with clear organisational responsibility.

### Going concern

The Directors have prepared profit and loss, balance sheet and cash flow forecasts for the Group for a period in excess of 12 months from the date of approval of the 2019 financial statements. These forecasts reflect an assessment of current and future end-market conditions and their impact on the Group's future trading performance. The forecasts show that the Group will be able to operate within the current committed debt facilities and show continued compliance with the Company's financial covenants. On the basis of the exercise described above and the Group's available committed debt facilities, the Directors consider that the Group and Company have adequate resources to continue in operational existence for a period of at least 12 months from the date of signing these financial statements. Accordingly, they continue to adopt a going concern basis in preparing the financial statements of the Group and the Company.

# Principal risks and uncertainties

Risk	Potential impact	Mitigation
<p><b>End-market risks</b> &lt;&gt;</p> <p>Vesuvius suffers an unplanned drop in demand, revenue and/or margin because of market volatility beyond its control</p> <p>Strategic alignment </p>	<p>Unplanned drop in demand and/or revenue due to reduced production by our customers</p> <p><b>Margin reduction</b></p> <p><b>Customer failure leading to increased bad debts</b></p> <p><b>Loss of market share to competition</b></p> <p><b>Cost pressures at customers leading to use of cheaper solutions</b></p>	<p>Geographic diversification of revenues</p> <p>Product innovation and service offerings securing long-term revenue streams and maintaining performance differential</p> <p>Increase in service and product lines by the development of the Technical Services offering</p> <p>R&amp;D includes assessment of emerging technologies</p> <p>Manufacturing capacity rationalisation and flexible cost base</p> <p>Diversified customer base: no customer is greater than 10% of revenue</p> <p>Robust credit and working capital control to mitigate the risk of default by counterparties</p>
<p><b>Protectionism and globalisation</b> &lt;&gt;</p> <p>The Vesuvius business model cannot adapt or respond quickly enough to threats from protectionism and globalisation</p> <p>Strategic alignment </p>	<p>Restricted access to market due to enforced preference of local suppliers</p> <p><b>Increased barriers to entry for new businesses or expansion</b></p> <p><b>Increased costs from import duties, taxation or tariffs</b></p> <p><b>Loss of market share</b></p> <p><b>Trade restrictions</b></p>	<p>Highly diversified manufacturing footprint with manufacturing sites located in 26 countries</p> <p>Strong local management with delegated authority to run their businesses and manage customer relationships</p> <p>Cost flexibility</p> <p>Tax risk management and control framework together with a strong control of inter-company trading</p>
<p><b>Product quality failure</b> &lt;&gt;</p> <p>Vesuvius staff/contractors are injured at work or customers, staff or third parties suffer physical injury or financial loss because of failures in Vesuvius products</p> <p>Strategic alignment </p>	<p><b>Injury to staff and contractors</b></p> <p><b>Product or application failures lead to adverse financial impact or loss of reputation as technology leader</b></p> <p><b>Incident at customer plant causes manufacturing downtime or damage to infrastructure</b></p> <p><b>Customer claims from product quality issues</b></p>	<p>Quality management programmes including stringent quality control standards, monitoring and reporting</p> <p>Experienced technical staff knowledgeable in the application of our products and technology</p> <p>Targeted global insurance programme</p> <p>Experienced internal legal function controlling third-party contracting</p>
<p><b>Complex and changing regulatory environment</b> ^</p> <p>Vesuvius experiences a contracting customer base or increased transaction and administrative costs due to compliance with changing regulatory requirements</p> <p>Strategic alignment </p>	<p><b>Revenue reduction from reduced end-market access</b></p> <p><b>Disruption of supply chain and route to market</b></p> <p><b>Increased internal control processes</b></p> <p><b>Increased frequency of regulatory investigations</b></p> <p><b>Reputational damage</b></p>	<p>Compliance programmes and training across the Group</p> <p>Internal Audit function</p> <p>Experienced internal legal function including dedicated compliance specialists</p> <p>Global procurement category management of strategic raw materials</p>
<p><b>Failure to secure innovation</b> &lt;&gt;</p> <p>Vesuvius fails to achieve continuous improvement in its products, systems and services</p> <p>Strategic alignment </p>	<p><b>Product substitution by customers</b></p> <p><b>Increased competitive pressure through lack of differentiation of Vesuvius offering</b></p> <p><b>Commoditisation of product portfolio through lack of development</b></p> <p><b>Lack of response to changing customer needs</b></p> <p><b>Loss of intellectual property protection</b></p>	<p>Enduring and significant investment in R&amp;D, with market-leading research</p> <p>A shared strategy for innovation throughout the Group, deployed via our R&amp;D centres</p> <p>Stage gate process from innovation to commercialisation to foster innovation and increase alignment with strategy</p> <p>Programme of manufacturing and process excellence</p> <p>Quality programme, focused on quality and consistency</p> <p>Stringent intellectual property registration and defence</p>

The arrows indicate the change in risk year-on-year

^ Increased   v Decreased   <> Stable

Risk	Potential impact	Mitigation
<p><b>Business interruption</b> ^</p> <p>Vesuvius loses production capacity or experiences supply chain disruption due to physical site damage (accident, fire, natural disaster, terrorism), industrial action, cyber attack or global health crisis</p> <p>Strategic alignment </p>	<p><b>Loss/closure of a major plant temporarily or permanently impairing our ability to serve our customers</b></p> <p><b>Damage to or restriction in ability to use assets</b></p> <p><b>Denial of access to critical systems or control processes</b></p> <p><b>Disruption of manufacturing processes</b></p> <p><b>Inability to source critical raw materials</b></p>	<p>Diversified manufacturing footprint</p> <p>Disaster recovery planning</p> <p>Business continuity planning with strategic maintenance of excess capacity</p> <p>Physical and IT control systems security, access and training</p> <p>Cyber risks integrated into wider risk-management structure</p> <p>Well-established global insurance programme</p> <p>Group-wide safety management programmes</p> <p>Dual sourcing strategy and development of substitutes</p>
<p><b>People, culture and performance</b> &lt;&gt;</p> <p>Vesuvius is unable to attract and retain the right calibre of staff, fails to instil an appropriate culture or fails to embed the right systems to drive personal performance in pursuit of the Group's long-term growth</p> <p>Strategic alignment </p>	<p><b>Organisational culture of high performance is not achieved</b></p> <p><b>Staff turnover in growing economies and regions</b></p> <p><b>Stagnation of ideas and development opportunities</b></p> <p><b>Loss of expertise and critical business knowledge</b></p> <p><b>Reduced management pipeline for succession to senior positions</b></p>	<p>Internal focus on talent development and training, with tailored career-stage programmes and clear performance management strategies</p> <p>Contacts with universities to identify and develop talent</p> <p>Career path planning and global opportunities for high-potential staff</p> <p>Internal programmes for the structured transfer of technical and other knowledge</p> <p>Clearly elucidated Values underpin business culture</p>
<p><b>Health and safety</b> &lt;&gt;</p> <p>Vesuvius staff or contractors are injured at work because of failures in Vesuvius' operations, equipment or processes</p> <p>Strategic alignment </p>	<p><b>Injury to staff and contractors</b></p> <p><b>Health and safety breaches</b></p> <p><b>Manufacturing downtime or damage to infrastructure from incident at plant</b></p> <p><b>Inability to attract the necessary workforce</b></p> <p><b>Reputational damage</b></p>	<p>Active safety programmes, with ongoing wide-ranging monitoring and safety training</p> <p>Independent safety audit team</p> <p>Quality management programmes including stringent manufacturing process control standards, monitoring and reporting</p>
<p><b>Environmental, Social and Governance (ESG) criteria</b> New</p> <p>Vesuvius fails to capitalise on the opportunity to help its customers significantly reduce their carbon emissions as environmental pressure grows on the steel industry or Vesuvius fails to meet the expectations of its various stakeholders including employees and investors</p> <p>Strategic alignment </p>	<p><b>Loss of opportunity to grow sales</b></p> <p><b>Loss of opportunity to increase margin</b></p> <p><b>Loss of stakeholder confidence including investors</b></p> <p><b>Reputational damage</b></p>	<p>Development of appropriate ESG measures for the business</p> <p>Investment in R&amp;D to develop products to assist our customers in reducing their carbon emissions and improve their own ESG measures</p> <p>Skilled technical sales force to develop efficient solutions for our customers</p> <p>The Group-wide Code of Conduct, ABC Policy with a zero tolerance regarding bribery and corruption</p> <p>Internal Speak Up mechanisms to allow reporting of concerns</p> <p>Extensive use of due diligence involving existing and potential investments, business partners and customers</p>

Strategic Alignment

- Deliver growth
- Generate sustainable profitability and create shareholder value
- Maintain strong cash generation and an efficient capital structure
- Provide a safe working environment for our people
- Be at the forefront of innovation
- Run top-quality, cost-efficient and sustainable operations
- Foster talent, skill and motivation in our people

See more about Our strategy on p14-15

# We are

## Technicians

## Developers

## Pioneers

# Innovators

I joined Vesuvius as a technical salesman in 2014, learning in-depth about its products and markets – a good preparation for moving to positions of greater responsibility. The key tasks of my current role are to ensure that projects are run efficiently and are aligned to the strategic goals of the Company, and that the working environment enhances creativity, motivation and professional growth.

At the Piedade site, we specialise in the manufacture of sensors and probes for the steel and foundry industries. My team develops products from beginning to end: from the sensors and hardware to the accessories, electronics and software. It's a bespoke manufacturing process that builds in innovation. We work with our large global R&D team to formulate solutions that would be difficult to resolve individually. It is through innovation that we deliver improved safety,

higher quality, better performance and higher-standard solutions for our customers. Knowing my team plays an important part in making this happen makes me proud.

Since joining the Company, I have grown professionally thanks to the opportunities and challenges presented to me, and the training I have received in business strategy, product innovation, management and finance. I enjoy the diversity of the Group – I have travelled to many places and have met and worked with people from all sorts of backgrounds and cultures. I would say if you want to be in and make a difference to this market, then Vesuvius is the right place to be.

**Rafael Jacob**  
Global Marketing & Technology Manager,  
Digital Services (Sensors & Probes),  
Piedade, Brazil

Find out more at  
[report2019.vesuvius.com](http://report2019.vesuvius.com)



## Our performance

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## Key Performance Indicators (KPIs)

We have performed well against our strategic metrics

The Board and management regularly monitor both financial and non-financial performance indicators to measure performance against objectives. The Board reviews these KPIs as part of its governance and risk management processes.

Strategic alignment	KPI	Purpose	Performance	Link to remuneration	
<b>Deliver growth</b> 	<b>Underlying revenue growth</b>	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	<b>Underlying revenue growth %</b> 2019 -5.7 2018 10.7 2017 12.5		
	<b>Generate sustainable profitability and create shareholder value</b> 	<b>Trading profit and return on sales</b>	Used to assess the trading performance of Group businesses	<b>Trading profit £m</b> 2019 181.4 2018 197.2 2017 165.5	Delivery of value to shareholders is linked to remuneration through the Vesuvius Share Plan ('VSP'), which measures the vesting of awards against total shareholder return ● VSP – Read more about this on p120-122
		<b>Headline profit before tax</b>	Used to assess the financial performance of the Group as a whole	<b>Return on sales %</b> 2019 10.6 2018 11.0 2017 9.8	
		<b>Headline earnings per share</b>	Used to assess the underlying earnings performance of the Group as a whole	<b>Headline profit before tax £m</b> 2019 171.4 2018 188.9 2017 152.9	
	<b>Return on net assets</b>	Used to assess the financial performance and asset management of the Group	<b>Headline EPS p</b> 2019 45.1 2018 49.6 2017 40.7	EPS is linked to remuneration as a measure used in the Annual Incentive Plan ('AIP') and the VSP ● AIP and VSP – Read more about them in the <b>Directors' Remuneration Report</b> on p114-125	
<b>Maintain strong cash generation and an efficient capital structure</b> 	<b>Free cash flow</b>	Used to assess the underlying cash generation of the Group. 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	<b>Return on net assets %</b> 2019 26.4 2018 30.4 2017 24.2		
	<b>Average working capital to sales ratio</b>		<b>Free cash flow £m</b> 2019 126.6 2018 106.0 2017 92.3	<b>Average working capital to sales %</b> 2019 24.0 2018 23.9 2017 24.9	In 2019, working capital performance was linked to remuneration through the use of the Group's working capital to sales ratio as one of the measures used in the AIP ● AIP – Read more about this on p118-119
	<b>Interest cover ratio</b>	Both ratios are used to assess the financial position of the Group and its ability to fund future growth	<b>Interest cover</b> 2019 21.8x 2018 22.8x 2017 15.8x	<b>Net debt to EBITDA</b> 2019 1.1x*** 2018 1.0x 2017 1.3x	

### Non-financial KPIs

Strategic alignment	KPI	Performance	Strategic Alignment	KPI	Performance
<b>Provide a safe working environment for our people</b> 	<b>Lost time injury frequency rate</b>	<b>Lost time injury frequency rate*</b>	<b>Run top-quality, cost-efficient and sustainable operations</b> 	<b>Total energy consumption</b>	<b>Energy Used kWh per metric tonne product packed for shipment</b>
		2019 1.5 2018 1.3 2017 1.6			2019 1,323 2018 1,292 2017 1,378
<b>Be at the forefront of innovation</b> 	<b>R&amp;D spend</b>	<b>Total R&amp;D spend** £m</b>	<b>Non-Financial KPIs - link to remuneration</b> The Executive Directors' personal objectives for the AIP contain targets in relation to non-financial matters, including improving Group safety performance and reducing the Group's normalised CO <sub>2</sub> emissions.	● Read more about <b>Sustainability</b> on p64-67	
		2019 29.1 2018 34.1 2017 33.2			<b>New product sales**** %</b> 2019 16.3 2018 15.4 2017 14.5

\* Work-related illness or injuries which resulted in an employee being absent for at least one day – measured per million hours worked.  
 \*\* At constant 2019 currency.  
 \*\*\* Excluding the impact of IFRS 16, the ratio in 2019 would be 1.0x.  
 \*\*\*\* Sales of products launched within the last five years as a % of total revenue.

## Financial review

# Our cash generation and focus on cash management, supports allocation of capital across a broad range of priorities

We maintained our strong balance sheet despite a backdrop of challenging end-markets

Guy Young  
Chief Financial Officer



£1,710.4m

Revenue

Reported -4.9% Underlying<sup>1</sup> -5.7%

£181.4m

Trading profit<sup>2</sup>

Reported -8.0% Underlying<sup>1</sup> -9.0%

29.8p

Statutory EPS

Reported -41.9%

10.6%

Return on sales<sup>2</sup>

Reported -40bps Underlying<sup>1</sup> -40bps

1. Underlying basis is at constant currency and excludes separately reported items and the impact of acquisitions and disposals.

2. For definitions of alternative performance measures, refer to Note 4 of the Group Financial Statements.

### Basis of preparation

All references in this financial review are to headline performance unless stated otherwise. See Note 4 to the Group Financial Statements.

### Introduction

Our resilient operating performance and cash conversion enabled capital allocation across all of our priority areas. We invested in organic and inorganic growth, while also paying an attractive dividend to our shareholders. This was possible despite a backdrop of challenging end-markets and while at the same time further reducing our net debt.

### 2019 performance overview

A challenging market environment in 2019 reduced demand in our key end-markets for both Steel and Foundry Divisions and led to a 5.7% fall in underlying revenue. Reported revenue decreased by £87.6m over the prior year and by £102.9m on an underlying basis. The restructuring programmes continued to deliver during 2019 with a total of £16.4m of incremental benefits reported. The impact of the reduction in revenue was partially mitigated by the restructuring benefits, with an overall reduction in trading profit to £181.4m, 8.0% lower than the prior year. Return on sales for 2019 on a reported basis at 10.6% was lower than the prior year by 40bps. In a year of reduced sales growth, and a focus on working capital management, our cash management performance was strong, achieving a 120% cash conversion.

### Dividend

The Board has recommended a final dividend of 14.3 pence per share to be paid, subject to shareholder approval, on 22 May 2020 to shareholders on the register at 17 April 2020. When added to the 2019 interim dividend of 6.2 pence per share paid on 20 September 2019, this represents a full-year dividend of 20.5 pence per share.

It remains the Board's intention to deliver long-term dividend growth, provided this is supported by underlying earnings, cash

flows, capital expenditure requirements and the prevailing market outlook.

### Capital allocation

We believe that the ideal leverage ratio for Vesuvius is in the range of 1.25x – 1.75x net debt to EBITDA. This gives us a reasonable comfort zone to be able to cater for any potential economic downturns. However, given we are currently below this range at approximately 1.1x net debt to EBITDA, it is increasingly relevant to consider our capital allocation priorities. In order of priority these are:

- Organic growth.** We have capital expenditure and restructuring programmes that we believe deliver the best possible returns to our shareholders.
- Inorganic growth.** We review acquisition opportunities against a strict set of assessment criteria, including: strategic fit; margin relative to Group target return on sales of 12.5%; and return on capital.
- Return cash to shareholders.** In the event that our organic and inorganic growth opportunities leave us with residual cash, we will seek to return that to our shareholders.

### Key Performance Indicators

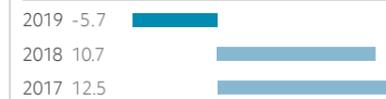
We have identified a number of KPIs against which we have consistently reported. As with prior years, we measure our results on an underlying basis, which we adjust to ensure appropriate comparability between periods, irrespective of currency fluctuations and any business acquisitions and disposals.

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 businesses acquired in both the current year and prior years

### Underlying revenue growth %

-5.7%



### Return on sales %

10.6% -40bps



Therefore, for 2019, we have:

- > Retranslated 2018 results at the FX rates used in calculating the 2019 results
- > Removed the results of the BMI refractory installation business, which was disposed of during 2018
- > Removed the results of CCPI which was acquired during 2019

### Objective: Deliver growth

#### KPI: Underlying revenue growth

Reported revenue for 2018 was £1,798.0m, which after FX translation effects and removing the impact of disposed businesses equates to £1,789.5m on an underlying basis. The reported revenue in 2019 of £1,710.4m, when adjusted for disposals and acquisitions, is £1,686.6m on an underlying basis, which is a decrease of 5.7% year-on-year. The decline has been as a result of weaker end-markets across all divisions.

### Objective: Generate sustainable profitability and create shareholder value

#### KPI: Trading profit and return on sales

We continue to measure underlying trading profit of the Group as well as trading profit as a percentage of sales, which we refer to as our return on sales or RoS.

Trading profit of £181.4m decreased by 8.0% on an underlying basis versus last year whilst RoS on an underlying basis was 40 basis points lower. The reduction in trading profit follows the decline in revenues, partially mitigated by the ongoing delivery of benefits from the restructuring programmes.

In a weakening market environment, our Steel and Foundry Divisions reported reduced volumes which were only partially offset by cost savings measures and the

ongoing delivery of benefits from the restructuring programme. As a result, the Steel Division recorded RoS of 10.0% this year, a decrease from 10.4% in 2018, whilst Foundry reported a 11.9% RoS, a decrease from 12.3% in 2018.

#### KPI: Headline PBT and headline EPS

Headline profit before tax (PBT) and headline earnings per share (EPS) are used to measure the underlying financial performance of the Group. The main difference between trading profit and headline PBT is net finance costs.

Net finance costs in 2019 of £11.0m were £0.1m below 2018. Movement in finance costs includes a £1.4m increase in interest on lease liabilities following transition to IFRS 16, offset by a £1.4m gain resulting from interest on an indirect tax rebate in Brazil.

Our headline PBT was £171.4m, 9.3% lower than last year on a reported basis. Including amortisation of acquired intangibles of £10.0m (2018: £12.9m), restructuring charges of £39.8m (2018: £15.3m) and vacant site remediation costs of £4.1m (2018: nil), our PBT of £118.6m was 24.1% lower than 2018. Headline EPS at 45.1p was 9.1% lower than 2018. Statutory EPS at 29.8p was 41.9% lower than 2018.

#### KPI: Return on net assets (RONA)

RONA is our principal measure of capital efficiency. We do not exclude the results of businesses acquired and disposed from this calculation, as capital efficiency is an important consideration in our portfolio decisions. It is calculated by dividing trading profit plus our share of post-tax profits from joint ventures by our average operating assets (property, plant and equipment, trade working capital, interests in joint ventures and associates, investments, and other operating receivables, payables and provisions).

### Revenue

£m	2019 revenue			2018 revenue			% change		
	As reported	Acquisitions/ (disposals)	Underlying	As reported	Currency	Acquisitions/ (disposals)	Underlying	Reported	Underlying
Steel	1,195.3	(23.8)	1,171.5	1,236.7	6.9	(18.3)	1,225.3	(3.3%)	(4.4%)
Foundry	515.1	-	515.1	561.3	2.9	-	564.2	(8.2%)	(8.7%)
Group	1,710.4	(23.8)	1,686.6	1,798.0	9.8	(18.3)	1,789.5	(4.9%)	(5.7%)

### Trading profit

£m	2019 trading profit			2018 trading profit			% change		
	As reported	Acquisitions/ (disposals)	Underlying	As reported	Currency	Acquisitions/ (disposals)	Underlying	Reported	Underlying
Steel	120.1	(2.5)	117.6	128.3	(0.2)	(0.7)	127.4	(6.5%)	(7.7%)
Foundry	61.3	-	61.3	68.9	0.3	-	69.2	(11.0%)	(11.3%)
Group	181.4	(2.5)	178.9	197.2	0.1	(0.7)	196.6	(8.0%)	(9.0%)

## Financial review continued

## Operating profit £m

£127.5m -22.5%



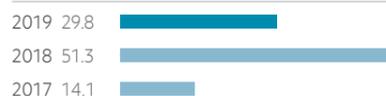
## Headline earnings per share pence

45.1p -9.1%



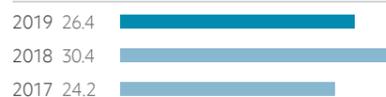
## Statutory earnings per share pence

29.8p -41.9%



## RONA moving average\* %

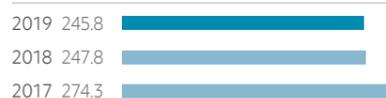
26.4%



\* For definitions of alternative performance measures, refer to Note 4 of the Group Financial Statements.

## Net debt\* £m

£245.8m



\* For definitions of alternative performance measures, refer to Note 4 of the Group Financial Statements.

As with most of our KPIs, we measure this on a 12-month moving average basis at average exchange rates for the year to ensure that we focus on sustainable underlying improvements. Our RONA for 2019 was 26.4% (2018: 30.4%) and reflects the reduction in profits, partially offset by the underlying reduction in working capital.

## Objective: Maintain strong cash generation and an efficient capital structure

## KPI: Free cash flow and working capital

Fundamental to ensuring that we have adequate capital to execute our corporate strategy is converting our profits into cash, partly through strict management of our working capital. Free cash flow from continuing operations was £126.6m for the year, £20.5m higher than last year on a reported basis due to a reduction in working capital, partially offset by additional capital expenditure during the year. Our cash conversion in 2019 was 120% (2018: 91%). Excluding the impact of the IFRS 16 adjustment to adjusted operating cash flows, cash conversion in 2019 would have been 113%.

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 2019 was 24.0% (2018: 23.9%), measured on a 12-month moving average basis. In absolute terms on a constant currency basis, trade working capital decreased by £54.4m, reflecting continued management focus, and assisted by the reduction in sales.

## KPI: Interest cover and net debt

As at 31 December 2019, the Group had committed borrowing facilities of £609.7m (2018: £573.7m), of which £174.2m was undrawn (2018: £119.2m).

Net debt at 31 December 2019 was £245.8m, a £2.0m decrease from 2018. The decrease was a result of strong cash conversion partially offset by restructuring costs, acquisition costs for CCPI, shareholder dividends and the impact of adoption of IFRS 16.

The Group's debt facilities have two financial covenants: the ratios of net debt to EBITDA (maximum three times limit) and EBITDA to interest (minimum four times limit). These ratios are monitored regularly to ensure that the Group has sufficient financing available to run the business and fund future growth. At the end of 2019, the net debt to EBITDA ratio was 1.1x (2018: 1.0x) and EBITDA to interest was 21.8x (2018: 22.8x). Excluding the impact of the IFRS 16 adjustment to net debt in 2019, the net debt to EBITDA ratio was 1.0x, in line with 2018.

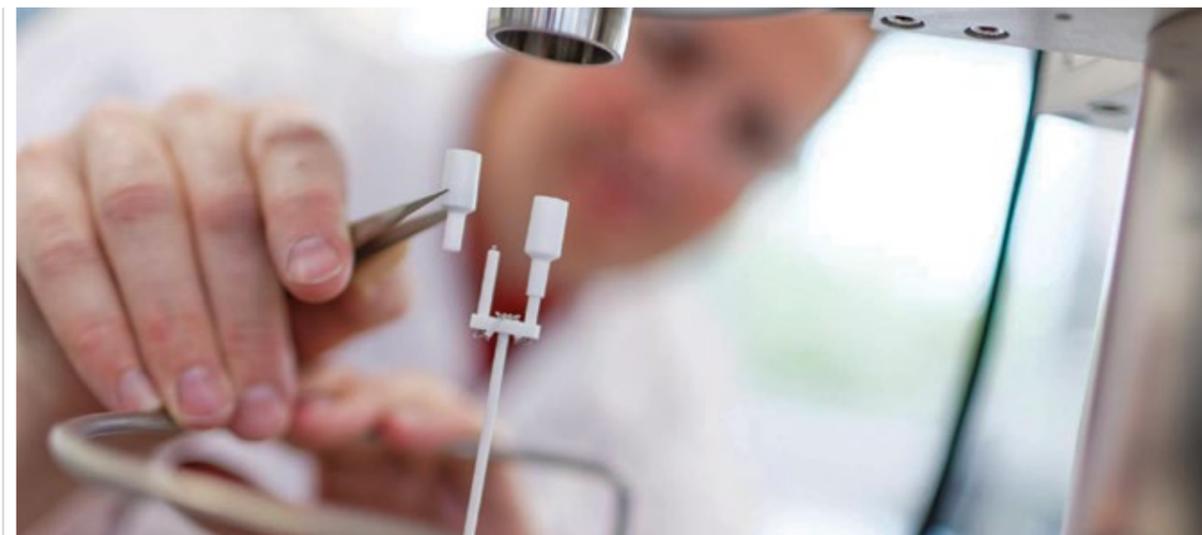
## Objective: Be at the forefront of innovation

## KPI: R&amp;D spend

We believe that our market-leading product technology and services deliver fundamental value to our customers and that the primary mechanism to deliver that value is to invest significantly in research and development. In 2019, we spent £29.1m (2018: £34.1m on a constant currency basis) on R&D activities, slightly lower than 2018 due to a timing lag between the restructuring of certain activities and the subsequent relocation and expansion of our R&D centres.

## Financial risk factors

The Group undertakes regular risk reviews and, as a minimum, a full risk assessment process twice a year. As in previous years, this included input from the Board in both the assessment of risk and the proposed mitigation. We consider the main financial risks faced by the Group as being those posed by a decline in our end-markets, leading to reduced revenue and profit as well as potential customer default. We also monitor carefully the challenges that come from broader financial uncertainty, which could bring lack of liquidity and market volatility. Important but lesser risk exists in interest rate movements, foreign exchange rate movements and cost inflation, but these are not expected to have a material impact on the business after considering the controls we have in place.



## Unutilised committed debt facilities £m

£174.2m



## Total R&amp;D spend\* £m

£29.1m -14.7%



\* At constant 2019 currency.

Our key mitigation of end-market risk is to manage the Group's exposure through balancing our portfolio of business geographically and to invest in product innovation. We do so through targeted capital investment in new and growing businesses and a combination of capital and human resource in emerging markets. When considering other financial risks, we mitigate liquidity concerns by financing, using both the bank and private placement markets. The Group also seeks to avoid a concentration of debt maturities in any one period to spread its refinancing risk. The Group's undrawn committed bank facilities at 31 December 2019 were £174.2m. Counterparty risk and customer default are mitigated by our relatively widespread customer base – with no customer being greater than 10% of revenue – and credit control procedures.

## Other relevant financial information

## Restructuring

Confronted with the significant deterioration of our main markets, we decided early in the year to expand and accelerate our restructuring programmes. During 2019, we delivered an incremental £16.4m of recurring cash savings. These savings were delivered according to plan with the exception of £1.2m due to some delays experienced in the Foundry EMEA and Advanced Refractories NAFTA restructuring projects. This is expected to be recovered in 2020.

The restructuring programmes are predominantly focused on rationalising our manufacturing footprint, consolidating production and streamlining various back office functions. During 2019, we successfully closed six plants in EMEA and two in the United States, without reducing our overall production capacity, and maintaining our proximity to customers in our regional markets. We acquired two plants in the United States through the CCPI acquisition, of which Blanchester has already been closed, and we opened a new Foundry manufacturing facility in Mexico. The net reduction of five plants in 2019 reduces our total manufacturing footprint from 59 in 2018 to 54 in 2019, with one further closure in 2020 in the United States already announced.

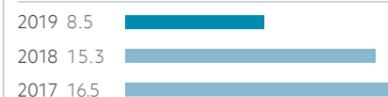
The restructuring programmes are now expected to deliver incremental recurring annual savings of £19.4m in 2020, £6.2m in 2021 and £1.9m in 2022, which is an increase of £3.0m in comparison with previously announced targets. This increase in recurring cash savings will be delivered at an additional one-off cash cost of £7.2m, of which £5.1m has already been charged and £2.1m will be incurred by 2021.

In 2019, we reported £39.8m of restructuring costs (2018: £15.3m) within separately reported items that were predominantly made up of redundancy, plant closure costs and asset write-downs. The cash costs in 2019 were £32.8m (2018: £19.3m). We are carrying forward into 2020 a restructuring provision of £19.1m (2018: £17.4m).

## Financial review continued

Net defined benefit pension deficit £m

£8.5m

**Vacant site remediation costs**

The Group owns a disused property in the US, which does not form part of our trading operations. Costs are being incurred at this site to address the significant increase in the volume of water run-off which occurred in 2019. We have engaged waste management specialists, are taking actions to reduce the level of water (including hydrological studies) and are in contact with the relevant regulatory authorities. We estimate that it will take 18 months to finalise remediation. The costs for this remediation are estimated to be £4.1m. These have been treated as a separately reported item due to the materiality and one-off nature of the costs. There has been no impact upon headline performance.

**Financial Reporting Council review of the 2018 Group Financial Statements**

The 2018 Group Financial Statements are subject to an ongoing review by the FRC's Corporate Reporting Review team as part of the usual cycle of reviews of listed companies' accounts. Further details of the scope of the FRC review are provided in Note 2.8 of the Group Financial Statements. This has resulted in us making a number of enhancements to our disclosures in the 2019 Group Financial Statements. As part of that enquiry, we have also reconsidered our application of IAS 36, Impairment of Assets. Previously, the Group identified cash generating units as the Steel and Foundry Divisions. We have now performed goodwill impairment testing at an operating segment level which are Steel Advanced Refractories, Steel Flow Control, Steel Digital Services and the Foundry Division. This has shown that the carrying value of the goodwill and certain tangible assets held in the Steel Digital Services operating segment could not be supported by value in use calculations as at 31 December 2017. Therefore the goodwill has been fully impaired at that date, resulting in an impairment of £17.4m. We have also identified impairment of tangible fixed assets of £10.2m. The effect of these impairments is a decrease in net assets of £27.6m as at 31 December 2017, 31 December 2018 and 31 December 2019. The impact on reported profit and cash flow for the years ended 31 December 2018 and 31 December 2019 is not material. Further details are provided in Note 17.2.

**Taxation**

A key measure of tax performance is the effective tax rate, 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 (2019: £170.4m, 2018: £186.1m). The Group's effective tax rate, based on the income tax costs associated with headline performance of £43.8m (2018: 48.4m), was 25.7% (2018: 26.0%).

The utilisation of our US tax losses and other temporary differences has increased the headline tax charge in 2019 by £7.4m (2018: £7.8m), increasing the effective rate of tax on headline profit before tax and share of post-tax profits from joint ventures by 4.3% (2018: 4.2%). The utilisation of US tax losses and other temporary differences includes the impact of the Global Intangible Low-Taxed Income (GILTI) rules which were introduced as part of US tax reform. The GILTI rules have increased the headline tax charge by £1.2m (2018: £2.4m).

The Group's effective tax rate is sensitive to changes in the geographic mix of profits and level of profits and reflects a combination of higher rates in certain jurisdictions such as Brazil, China, Germany, India, Mexico and the US, a nil effective rate in the UK due to the availability of unutilised tax losses, and rates that lie somewhere in between.

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 between 26% and 27% in 2020.

The income tax credit on separately reported items of £11.7m (2018: £36.8m credit) comprises £2.5m non-cash deferred tax movements relating to the amortisation of a deferred tax liability mainly arising from the 2008 acquisition of Fosco plc (2018: £2.8m), £9.2m tax credits relating to restructuring charges (2018: £1.8m) and a net increase in the deferred tax asset recognised in respect of US tax losses and certain other temporary differences of £nil (2018: £32.2m increase).

The net tax credit reflected in the Group Statement of Comprehensive Income in the year amounted to £1.9m (2018: £6.0m credit), comprising a £1.9m credit (2018: £1.3m charge) related to tax on net actuarial gains and losses on the employee benefits plan and in 2018 there was a £7.3m credit for additional recognition of US pension deferred tax assets.

# We are Analysts Strategists Entrepreneurs Enablers

**Ash Shah**  
Deputy Group Financial Controller  
London, UK

**Capital expenditure**

Capital expenditure in 2019 of £74.7m (2018: £48.4m) comprised £53.6m in the Steel Division (2018: £34.4m) and £21.1m in the Foundry Division (2018: £14.0m). The increased spend in 2019 reflects investment in infrastructure to support our restructuring activities and includes the addition of £9.2m of right of use assets, now classified as capital expenditure under IFRS 16. Capital expenditure on revenue-generating customer installation assets, primarily in Steel, was £7.8m (2018: £7.7m).

**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 largely closed to further benefits accrual and 58.4% of the liabilities in the UK have already been insured. The total net deficit attributed to these defined benefit obligations at 31 December 2019 was £8.5m (2018: £15.3m), representing an improvement of £6.8m.

The improvement is driven by £9.8m from cash contributions and payments of unfunded benefits and £5.7m from foreign exchange movements. These were offset by £3.6m from changes to actuarial assumptions (attributable to reducing discount rates, updated mortality assumptions and pension membership data) and additional accrual and administrative expenditure paid for the year of £5.1m.

The majority of the ongoing pension plans are defined contribution plans, where our only obligation is to make contributions, with no further commitments on the level of post-retirement benefits. During 2019, cash contributions of £11.3m (2018: £11.4m) were made into the defined contribution plans and charged to trading profit.

**Corporate activity**

In March 2019, the Group completed the acquisition of CCPI Inc, a specialist refractory producer based in Ohio, USA, focused on tundish (steel continuous casting) applications and aluminium.

The transaction valued the company at £33.3m on a cash and debt free basis. The integration of CCPI is proceeding as planned; during the year, we closed CCPI's main facility at Blanchester and absorbed its production volume into our existing North American manufacturing footprint. The transaction is highly synergistic, and these synergies are included in the restructuring savings targets.

In June 2019, the Group disposed of its 50% interest in Angang Vesuvius Refractory Company Ltd for a cash consideration of £6.8m, resulting in a profit after foreign currency adjustments of £1.1m.

**Guy Young**  
Chief Financial Officer  
27 February 2020

## Operating reviews

### Steel Division

Vesuvius' Steel Division reported revenues of £1,195.3m in 2019, a decrease of 3.3% compared with 2018.

On an underlying basis, Steel Division revenue was down 4.4%. Markets deteriorated in the majority of regions during the course of 2019 after a strong 2018. The 'high technology' segment of the steel market, key for the Flow Control business unit, suffered in 2019 proportionately more than the more commoditised construction steel market, due in particular to weakness in light vehicle volumes. This deterioration of our markets was amplified by a general destocking throughout the supply chain, particularly in EMEA. Our sales were also affected by the external regulatory environment, which disrupted trade flows.

According to the World Steel Association, global steel production in 2019 increased by 3.4% compared with 2018, reflecting, amongst other things, a significant increase in Chinese production of 8.3%. However, global steel production excluding China declined by 1.7%. On a regional basis, crude steel production contracted in all regions except in Asia and the Middle East (including Turkey). Production decreased in Europe (EU27 + UK), NAFTA and South America by 4.9%, 0.8% and 8.3% respectively. Production in India, the Middle East and South East Asia increased by 1.8%, 5.1% and 9.7% respectively.

On a reported basis, Steel Division trading profit decreased 6.5% year-on-year. On an underlying basis, trading profit decreased by 7.7%, with the decrease in return on sales limited to 40 basis points thanks to the restructuring savings. Those savings were delivered according to plan with the exception of Advanced Refractories in NAFTA where some delays were experienced. This is expected to be recovered in 2020.

### Steel Flow Control

We delivered improvements in our cost base through plant efficiency and optimising production between plants

#### Revenue £m

£626.3m



#### 2019 performance

Steel Flow Control reported revenue of £626.3m in 2019, a decrease of 5.5% compared with 2018 on a reported basis, whilst underlying revenue decreased 5.8%. Underlying regional performance was mixed, with Americas and EMEA revenue decreasing by 2.1% and 13.0% respectively, and Asia-Pacific revenue increasing by 0.4%.

In NAFTA, Steel Flow Control's underlying revenue decreased by 4.3%<sup>1</sup> due to unfavourable customer mix. In South America, Steel Flow Control's underlying revenue was stable, as the decrease in revenue due to steel market weakness was offset by market share gains. Steel Flow Control's underlying revenue in EMEA decreased by 13.0% contributed to by steel market weakness and destocking at steel plants. Underlying revenue in Asia-Pacific was up 0.4% with revenue in China increasing by 4.6%<sup>1</sup>, continuing our track record of growth in this important region.

#### Strategic highlights from the year

##### Restructuring programmes and process improvement initiatives

During 2019, we continued our focus on cost leadership with our manufacturing rationalisation programmes in NAFTA, South America, India and EMEA delivering improvements in our cost base through a combination of increasing plant efficiency and optimising production volumes between plants.

During the year, we closed four manufacturing sites in EMEA and NAFTA without reducing our total production capacity.

In addition to these initiatives, we targeted process improvements aimed at increasing the quality and consistency of products. For example, in China we have increased the level of automation of our production process and in Skawina, Poland we implemented changes to our shift pattern, enabling us to increase productivity at this key site. The optimisation work performed here has allowed us to increase cost-efficiency and create capacity to absorb volume growth as this returns to our core markets.

##### Global mechatronic business

Our mechatronic activity is developing rapidly and during 2019 we gained our first customer in China. We now have nine active projects and our mechatronic technology centre in Belgium is being expanded to respond to the growing demand. This positions Vesuvius well in supporting our customers to face the future challenge of automation and underpins a greater focus on quality and consistency in product application.

1. Regional/country revenue has been calculated on a customer location basis.

We are  
Technicians  
Analysts  
Managers  
Problem-  
solvers



Renee Bell  
Quality Coordinator  
Chicago Heights, US

## Operating reviews – Steel Flow Control continued

### Global digital services offering

In 2019, we further developed our capabilities in Flow Control's digital services offering, with a focus on providing our customers with a complete solution for the collection and analysis of data to improve the efficiency of their continuous casting processes.

Our solution includes continuous temperature measurement sensors for the tundish and the mould, as well as surface quality sensors monitoring the quality of the cast steel slab.

Our equipment allows the customer to monitor and control their continuous casting process, optimising productivity and yield, whilst also improving the quality and consistency of the steel produced.

### Global mould flux business

During 2019, we continued to develop our flux feeding equipment, increasing the level of automation, improving safety around the caster and optimising our customers' continuous casting process consistency and quality. We have also continued our research activities to develop higher-performance products for both the tundish and the mould. Our experienced technicians are able to work closely with our customers to deliver bespoke products optimised for their steel grades and production processes.

Management of the flux business is now integrated into the Flow Control line, allowing us to more effectively coordinate the opportunities that exist in the interactions of our flux and refractory products.

### Technological leadership

During the year, we accelerated our R&D effort to support long-term profitable growth. We launched three new refractory products: the new generation of ladle slide-gate plates and systems and the new high-performance tundish slide-gates, all providing value to our 'high-technology steel' segment customers. These new refractory products help our customers improve the quality of steel and increase safety in the workplace. The new generation of ladle slide-gates has enhanced performance and provides significant improvements in safety, ergonomics and economics for our customers. The new high-performance tundish slide-gates help our customers to increase the safety level in the workplace during both installation and operation whilst bringing flexibility and enhanced performance.

During the year, we have also continued the expansion of our global R&D network, with the opening of our new R&D centre in Suzhou, China and the continued development of our mechatronics technology centre in Ghlin, Belgium.

### Our people

We continue our efforts to attract, develop and retain the best talent worldwide. We believe in diversity of talent, underlined by our focus on ensuring our R&D network is global and our team of P&L managers is as international as possible. We have also focused on organising our business around empowered, accountable and results-oriented P&L managers operating close to our end-markets and customers.



### Our new high-performance tundish system

- > CNC Protect provides our customers with the opportunity to shift from open-stream casting to a fully protected stream in a very flexible way
- > Casting billets in a submerged mould environment protects the steel against re-oxidation and delivers better internal cleanliness, less cracks and a better surface quality
- > The CNC Protect system also enhances safety during installation and operation



### Steel Flow Control's value-added solutions include:

- > **Refractories:** Consumable ceramic products to contain the flow of molten steel, e.g. ladle shroud and slide-gate refractory
- > **Systems:** Mechanisms using ceramic products that control the flow of molten steel, e.g. slide-gate and stopper mechanisms
- > **Robotics:** Installing and replacing Vesuvius' consumables in very harsh environments increasing the safety and consistency of our customers' operations
- > **Digital services:** Control of the continuous casting process, including mould level control, laser measurements of the ladle and continuous temperature measurement devices
- > **Technical support:** Teams of experts available to our customers helping them with the design and modelling of the molten steel through the continuous casting process

## Steel Advanced Refractories

During 2019, we continued to improve our value-added solution offering for our customers

### Revenue £m

£539.8m

2019	539.8
2018	541.1
2017	502.3

### 2019 performance

Our Steel Advanced Refractories business unit reported revenue of £539.8m in 2019, a decrease of 0.3% compared with 2018 on a reported basis, whilst underlying revenue decreased 2.3%. This resilient performance, despite a challenging market environment, was supported by market share gains in China and the CCPI acquisition.

Underlying regional performance was mixed, with Asia-Pacific revenue increasing by 4.7% and Americas and EMEA revenue decreasing by 0.5% and

6.7%, respectively. The strong revenue growth in Asia-Pacific was due to increased penetration of our value-creating solutions in China, Vietnam, Malaysia and Indonesia. In NAFTA, the positive impact of the CCPI acquisition partially offset weaker end-markets and an unfavourable customer mix, whilst the revenue decrease in South America was due to weak market conditions. In EMEA, revenue decreased on the back of unfavourable market conditions, as well as on priority being given to return on sales over revenue growth.

### Strategic highlights from the year

#### Restructuring programmes and process improvement initiatives

We continued to review and improve our manufacturing network, reinforcing our operational excellence and streamlining manufacturing operations. Following the successful reorganisation of production in South America, similar initiatives were launched in Europe and NAFTA delivering improvements in the cost base through a combination of increased efficiency and adapting production volumes between plants. This continued focus on operational excellence allows us to reinforce our cost leadership and the competitiveness of our manufacturing base.

In March 2019, the Group completed the acquisition of CCPI Inc, a specialist refractory producer based in Ohio, USA, focused on tundish (steel continuous casting) applications and aluminium. The integration of CCPI is proceeding as planned; during the year, we closed CCPI's main facility at Blanchester and absorbed

## Operating reviews – Steel Advanced Refractories continued

**Advanced Refractories' value-added solutions include:**

- > **Monolithics and shaped refractory materials:** (In both magnesia (basic) and alumina silicate (acid) formulations) supplied by Vesuvius in the form of powder mixes, which are spray-applied or cast onto the vessel to be lined (i.e. monolithics) and in the form of shapes (e.g. bricks, pads, dams and other larger precast shapes)
- > **Tap hole clay:** A refractory mass used to plug the tapping hole at the base of a blast furnace. When molten iron is ready to be extracted from the blast furnace, a drilling machine perforates a hole through the solidified clay to start the tapping process
- > **Installation technologies:** Are key to ensure the quality of the end product and are critical for the installation of refractory products in extreme temperature environments
- > **Lasers:** Help track the performance of the installed refractories and instruct the customer in advance, where specific wear can be repaired or where a vessel becomes unsuitable for further use
- > **Computational fluid dynamic capabilities:** Are used by our engineers to simulate the flow of molten metal during the process of steel-making, aluminium-making, etc. Our engineers help our customers optimise their molten metal flow by designing customised refractory shapes to ensure the most efficient flow dynamics

its production volume into our existing North American manufacturing footprint. The transaction is highly synergistic and these synergies are included in the restructuring savings targets.

**Technological leadership**

During 2019, we continued to improve our value-added solution offering for our customers, which includes refractories, installation technologies (including robots), computational fluid dynamics capabilities and lasers. We are experiencing increased demand for our refractory application robots, which enable our customers to eliminate the risk of human presence in dangerous working areas and also the risk of human errors, whilst at the same time improving the quality of installation. At the same time, we have registered an increased interest globally in laser measurements, which allow customers to track the wear profile of the refractories in use to enable targeted repair, delaying the need for costly full replacements. In 2019, we sold more than 20 lasers, half of which were bought by customers located in Asia.

In 2019, we continued to invest in our global R&D network with the expansion of our research facility in Visakhapatnam, India to reinforce our presence in this key market for our future growth, and to enable us to better tap into the growing talent pool of engineers and scientists in the country. We have also increased our expertise in robotics and mechatronics

to ensure that we continue to be at the forefront of the developing technology in this area. During the year, we reinforced our global R&D team with c.15 new team members from all over the world.

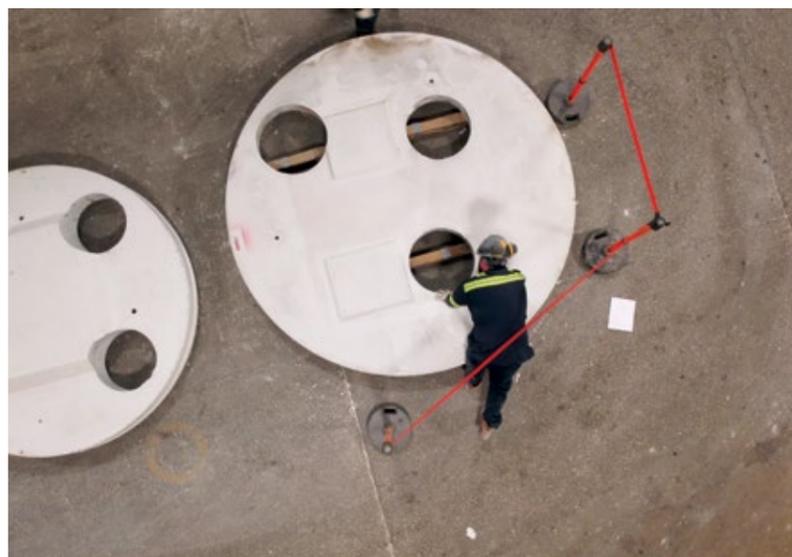
**New value-added solutions**

In 2019, we accelerated our R&D effort as we launched several additional new value-added solutions. Our product launches are focused on enhancing our customers' productivity, efficiency and safety in the blast and reheat furnaces and tundish operations, through new and optimised monolithic formulations, bricks, precast shapes and installation practices.

**Our people**

We continued our focus on attracting the best talent everywhere in the world, reinforcing our management team and ensuring our organisation is run by entrepreneurial, empowered and accountable managers on the ground, who are close to our end-markets and customers. One of Vesuvius' key strengths is the strong relationship between Vesuvius' employees and our customers, with the majority of our customer-facing employees working every day at a steel mill or aluminium plant. Our employees' knowledge of the flow of molten metal and their ability to understand our customers allows us differentiation, which is intrinsic to us maintaining our position in the market.

ELBY™ ladle bottom under construction.

Steel Digital Services  
(Sensors & Probes)

We continued our restructuring activities, rationalising our footprint to focus on our core products

**Revenue £m**

£29.2m

**2019 performance**

Steel Digital Services (Sensors & Probes) generated revenue of £29.2m, a decrease of 11.2% year-on-year on a reported basis. On an underlying basis, revenue decreased 9.6%. This decline in revenue reflects the challenging market environment, in particular in EMEA.

**Strategic highlights from the year**

During 2019, the Steel Digital Services business unit underwent a reorganisation of its structures and systems, which will increase the flexibility and competitiveness of the business.

We also continued the restructuring initiatives started in 2017 to optimise our cost base and manufacturing footprint for sensors and probes, and to reduce operating costs. As a consequence of these actions, during the year we closed two manufacturing sites and concentrated our production in the remaining facilities.

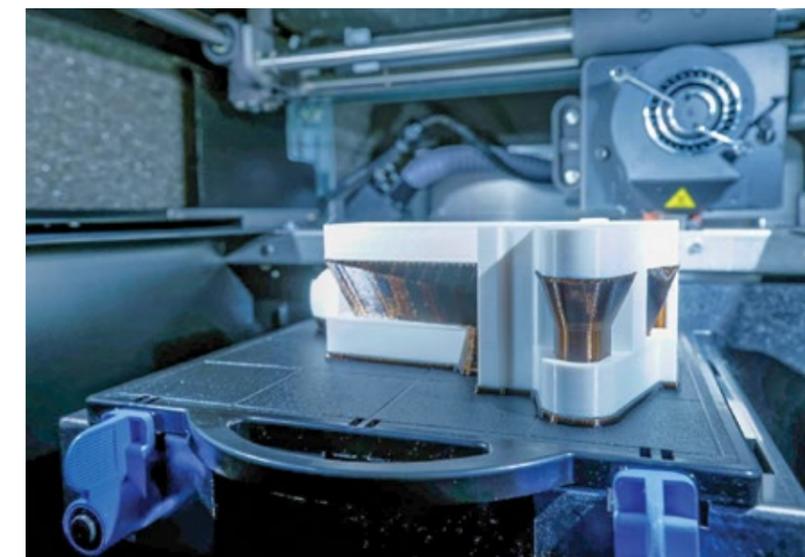
A global management structure was put in place to unify the focus of our two manufacturing sites in Italy and Brazil. We also continued our investment programme to increase automation in our manufacturing processes redesign.

At the beginning of 2018, the activities which used to belong to the Technical Services business unit, and which have strong synergies with our consumable sales, were integrated into our Flow Control and Advanced Refractories business units.

The part of Technical Services related to discrete sensors and probes was maintained in the Steel Digital Services (Sensors & Probes) business unit, which now offers products to our customers to enable them to measure certain key characteristics of the molten metal during the steel-making process and make their underlying processes more efficient and reliable.

The products supplied by Steel Digital Services include temperature sensors, oxygen, hydrogen and substance probes, iron oxide and metal sampling for the steel, aluminium and foundry industries.

By using these technologies, customers can focus on critical parameters within their processes, enabling them to refine their production methods to improve quality, lower production costs and maximise efficiency.



Steel Digital Services' 3D printing technology

## Operating reviews – Foundry Division

## Foundry Division

We continue to invest in our team of technical experts to provide our customers with the best solutions and advice on how to maximise the efficiency of their production processes.



### Launch of a unique feeding system technology for aluminium castings

- > Provides a more economical solution for our customers because it eliminates the need for additional powders
- > Cleaner and more consistent metal casting
- > Produces lower emissions during the casting process

We maintained our focus on operational excellence, implementing lean improvements across our plants

#### Revenue £m

£515.1m



#### 2019 performance

There was a challenging environment in Foundry end-markets during 2019, with weakness in light vehicle production in all regions. There were also declines in the construction and agricultural equipment markets in NAFTA, India, South America and North Asia, a reduction in activity in general engineering and mining in EMEA, India and North Asia and a decline in medium/heavy commercial vehicle production in most regions.

Consequently, revenue in the Foundry Division decreased 8.2% to £515.1m in 2019 on a reported basis, whilst underlying revenue decreased by 8.7%. Underlying trading profit and return on sales decreased by 11.3% and 40 basis points, respectively. Our performance in 2019 was also impacted by delays in the realisation of restructuring savings in EMEA. These are expected to be achieved in 2020.

However, against this backdrop we were successful in increasing prices where necessary to compensate for the historical raw material and other cost inflation, which we highlighted in our 2018 results.

In the Americas, underlying revenue decreased by 5.3% due to weak end-markets in both NAFTA and South America. Underlying revenue in EMEA decreased by 10.2% year-on-year as a result of the challenging market environment, with weakness in the light, commercial vehicle production and general engineering end-markets. In Asia-Pacific, underlying revenue decreased by 8.9%. In North Asia and India, Foundry Division revenue was down 11.1%<sup>1</sup> and 11.5%<sup>1</sup> respectively due to weakness in all foundry end-markets.

1. Regional/country revenue has been calculated on a customer location basis.

#### Foundry's value-added solutions include:

- > **Feeding systems:** Our customised insulating and exothermic feeding systems allow for the efficient supply of molten metal to key areas of complex and/or large castings, and prevent liquid shrinkage defects in the finished casting, improving yields and productivity by reducing the amount of molten metal required per casting. In addition, our exothermic feeding systems provide a secondary heat source which can also control metal cooling, minimising the adverse effects of shrinkage during solidification
- > **Filters:** Remove impurities from the liquid metal and reduce turbulence during pouring
- > **Coatings:** Protect both sand and permanent moulds from the effects of being filled with liquid metal
- > **Crucibles:** Used in a wide range of melting and holding applications for non-ferrous alloys, particularly aluminium, copper and zinc. Each of these applications requires a crucible with specific properties to maximise productivity and minimise energy use
- > **Other products:** These include binders which are used to prepare the sand moulds and cores, inoculants used for ferrous castings, flux degassing equipment for removing hydrogen in liquid aluminium and refractory materials used in the melting and transportation of liquid metal

# We are Researchers Developers Strategists Purchasers



Paul Benson  
NAFTA Purchasing Director  
Pittsburgh, USA

#### Strategic highlights from the year

##### Restructuring programmes and process improvement initiatives

The organisational restructuring in North America and Europe, which commenced in 2016 and 2017 respectively, continued through the year with a focus on rationalising our manufacturing footprint and maximising capacity utilisation. During the year, we closed two manufacturing sites located in North America and Europe.

We also continued to focus on operational excellence by implementing lean improvement programmes at all our plants.

In 2019, we inaugurated our new state-of-the-art and environmentally friendly plant in Ramos Arizpe, Mexico. We invested in a world-leading plant design which will accelerate the profitable growth of the Foundry Division in North America.

##### New value-added solutions and technological leadership

In 2019, we continued our efforts in R&D which resulted in several new product

launches. For example, during the year we launched our new filter technology for large, high-value castings. This minimises air entrainment in the metal stream, preventing the formation of oxides, leading to cleaner metal and improved fluidity, which in turn enables the use of finer filters, further improving final casting quality. We have also introduced our unique feeding system technology for aluminium casting, which eliminates the need for additional metal treatment (through powdered additives). It delivers cleaner and more consistent metal casting and produces lower emissions during the casting process. Thus our solutions drive efficiency and provide economically attractive solutions for customers.

We have continued to invest in our team of technical experts, especially in the emerging markets of China, India and Eastern Europe, to provide to our customers the best solutions and advice on how to maximise the efficiency of their production processes.

#### Our people

We have also continued to focus on succession planning and people development with several key new employees joining during the year. We have invested time in selecting entrepreneurial managers to strengthen our team and drive future growth in the business, and promoted employees that have shown entrepreneurial potential. Each of these initiatives delivered an improved organisational culture and accountability, whilst moving decision-making closer to the customer and increasing our speed of doing business.

Our businesses in EMEA and North Asia are under new regional leadership. We have implemented a dedicated commercial organisation focusing on the non-ferrous sector in EMEA, whilst we realigned our commercial organisation in the USA and Canada. Further investment was made in plant management, in particular focusing on top-quality operational leadership for our flagship plants.

# We are Innovators Entrepreneurs Enablers Global leaders

I am relatively new to the Company, having moved to the Vizag facility in India, in July 2019, from a role in the chemical industry in the United States. One of the aspects that attracted me to Vesuvius was its ethos of bringing talent in from a spectrum of industries.

My role in Vizag is to establish our R&D laboratory as a regional and global 'centre of excellence' for Al-Si monolithics, tap-hole clay competency and raw material qualification. Vesuvius encourages us to expand our know-how and perspectives through collaboration with universities and other external institutions, such as the Indian Institute of Technology. By tapping into additional knowledge bases, R&D is the bridge to developing new products and business opportunities for Vesuvius.

The team I manage comprises 12 talented and highly motivated scientists and technical specialists. I present the

context for their contribution so they can see how it fits into the bigger picture of what Vesuvius wants to achieve. Not only does that encourage innovation, it also supports them in their own career paths. Equally, Vesuvius is advancing my experience by giving me global exposure and state-of-the-art capability within the R&D field. Working closely with other areas of the business, including quality control, production, sales and marketing, and technology, adds insight into how we can deliver for the customer.

The vision I have for Vizag is to develop a handful of disruptive, breakthrough technologies that put our R&D profile on the global map.

**Saji Meledathu**  
R&D Director for Advanced Refractory,  
India and South East Asia

Find out more at  
[report2019.vesuvius.com](http://report2019.vesuvius.com)



## Non-financial information

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## Non-financial information statement

This non-financial information statement provides information on the Group's activities and policies in respect of:

### Environmental matters

➤ Sustainability p64-67

### The Company's employees

➤ People and community p68-71

### Social matters

➤ People and community p72-73

### Respect for human rights

➤ Our principles p56

### Anti-corruption and anti-bribery matters

➤ Our principles p56

The 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 matters are detailed in the Group's schedule of Principal risks and uncertainties on p32-33

➤ Risk, viability and going concern p28-31

### Details of the Group's business model

➤ p20-21

### Details of the Group's non-financial KPIs

➤ p36-37

## Our principles

Working together with shared Values makes Vesuvius stronger

Vesuvius is a geographically and culturally diverse group, employing more than 10,000 people in 41 countries.

This geographical diversity places us close to our customers across the globe, but 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.

Vesuvius has established a framework for explaining and delivering the culture and principles we consider to be fundamental to our sustained success, engaging staff across the Group in general and targeted

training to ensure a consistent understanding of our policies and procedures.

### Vesuvius' Values

The Group's CORE Values: Courage, Ownership, Respect and Energy are actively supporting the Group's priorities, encouraging consistent behaviours across the Group in order to sustain our business success in the future. These Values, and the described behaviours underpinning them, convey the mindset and attitudes we expect each employee to actively demonstrate every day. They are an expression 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 prominently displayed at all sites as visual reminders and they are reinforced through our performance management systems, ensuring that they are firmly embedded in our day-to-day conversations.



## Our strength comes from our

Courage  
Ownership  
Respect  
Energy  
**CORE**



Melissa Roden  
Compliance Director  
London, UK

With our CORE Values, we are telling the world who we are and what we stand for

### 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

### 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

### 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, foster esteem and fairness with customers, suppliers, coworkers, 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

### 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

## Our principles continued

### 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 its worldwide operations. The Code 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 each of our 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 in which we deal with our customers, business associates, employees, investors and local communities. The Code of Conduct is published in our 29 major functional languages.

#### Code of Conduct principles

 Health, safety and the environment

 Trading, customers, products and services

 Anti-bribery and corruption

 Employees and human rights

 Disclosure and investors

 Government, society and local communities

 Conflicts of interest

 Competitors

The Code of Conduct is available in 29 languages at [www.vesuvius.com](http://www.vesuvius.com)

### Policies and procedures

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. Amongst these policies are:

#### Speak Up

Vesuvius employees can speak up without fear of retaliation, either to Vesuvius management or via independent channels. A third-party-operated confidential Speak Up Helpline (Speak Up) is available for employees wishing to raise concerns anonymously or in situations where they feel unable to report internally. This independent facility supports online reporting through a web portal or reporting by phone or by voicemail. Ensuring global accessibility, employees can speak with operators in any of our 29 functional languages.

The helpline is publicised through local language posters at each of our sites, our internal website and during internal compliance training and new joiner induction. No Vesuvius employee will ever be penalised or disadvantaged for reporting a legitimate concern in good faith.

Reports received via Speak Up channels are managed by the General Counsel and Compliance Director. When received, reports are assessed for risk and category of concern. All reports are investigated following a protocol for review, investigation, action, closure and feedback independent of management where necessary, but involving senior business unit or HR management as appropriate. For complex issues, formal investigation plans are drawn up, and support from external experts is engaged where necessary. Feedback is recognised as an important element of the Speak Up process and we aim to provide an update on all reports within 28 days of receipt.

#### Human rights

The Group Human Rights Policy reflects the principles contained within the United Nations Universal Declaration of Human Rights, the International Labour Organization's Fundamental Conventions on Labour Standards and the United Nations Global Compact. The Policy applies to all Group employees. It 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.

The Group commits not to discriminate in any of our employment practices and to offer equal opportunities to all. The Group respects the principles of freedom of association and the effective recognition of the right to collective bargaining and opposes the use of, and will not use, forced, compulsory or child labour. These principles have been integrated into the work of our procurement teams as we assess our suppliers and their business practices. In compliance with the UK Modern Slavery Act, the Group published its fourth annual statement in May 2019.

#### Anti-bribery and corruption and working with third parties

We engage with various third-party representatives and intermediaries in our business. We recognise that they can present an increased anti-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.

#### Data protection

Our Data Protection Policy requires a uniform approach in the handling of personal data to manage the privacy obligations of the Group. Everyone has rights in respect of how their personal data is handled. Our Policy recognises that the lawful and correct treatment of personal data is vital to our continued success in an increasingly regulated global marketplace. During the course of our activities, we may collect, store and process personal data about our staff, customers, suppliers and other third parties. We are committed to treating this data in an appropriate and compliant manner.

#### Training

During the year, we continued to develop our training programme on the principles contained in the Vesuvius Code of Conduct and associated anti-bribery, corruption and other compliance policies and procedures. 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 one of us to respond to

those risks. We operate an integrated learning management system which allows us to deliver Vesuvius-specific e-learning modules to employees on topics relevant to their role through an online interactive platform.

Training provided during 2019 included:

- > An updated e-learning module for Anti-Bribery and Corruption, available in 22 of our functional languages
- > Webex and video conference workshops
- > Face-to-face training by the Legal and Compliance team to staff at several sites covering Anti-Bribery and Corruption, Speak Up and trade sanctions

Our e-learning platform supplements the face-to-face training provided to employees by the Legal and Compliance team, enabling us to reach more employees, more quickly and in a more targeted way. In 2020, we will continue to develop the training processes, modules and languages available.

#### Monitoring and evaluation

Alongside our training programme, we assist employees with the implementation and interpretation of the Group's policies, and their application through a process of monitoring and evaluation. Part of this process involves performing ongoing and targeted due diligence and risk assessments to inform our policy design and its application. This forms part of our compliance framework to ensure that our approach remains fit for purpose and is understood throughout the business.

#### Speak Up

In line with good practice, details of the Group's Speak Up channels, and the Group's approach to addressing such issues, was recommunicated in 2019. We continue to monitor the volume, geographic distribution and range of reports made to the Speak Up facility to ascertain not only whether there are significant regional compliance concerns, but also whether there are countries where access to this facility is less well understood or publicised. During 2019, the Board monitored and oversaw the Group's procedures for reporting allegations of improper behaviour, and throughout the year received updates on the nature and volume of reports received from the confidential Speak Up Helpline, key themes emerging from these reports and the results of any investigations undertaken. In 2019, we received 26 reports (2018: 21) through the Speak Up facility. Each one of these was

investigated. Similar to 2018, a substantial majority of reports received in 2019 were human resource issues which indicated no compliance concerns, nor serious breaches of the Code of Conduct. Of the small number of reports received that contained allegations in breach of our Code of Conduct, thorough investigations were performed and, where appropriate, disciplinary action was taken, including individuals leaving the Group as a result.

#### Prevention of slavery and human trafficking

During 2019, we published our fourth 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](http://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)

During 2019, we conducted 203 supplier audits. To ensure effective communication of our Human Rights Policy and output of our modern slavery risk assessment, we provided face-to-face training to our key purchasing staff and continue to use an online e-learning module to upgrade the training given to all supplier-facing staff. This provides key guidance on the red flags associated with modern slavery to assist them in identifying these during supplier visits and accreditation.

#### Working with third parties

During 2019, the Group continued the review of our third-party representatives and intermediaries. Following the 2017 enhanced review of sales agents, we extended our review to the work of our custom clearance agents and logistics providers. This included a detailed review of our due diligence activities on active custom clearance agents and logistics providers across the Group. This process covers public information searches, regulatory searches and activity review. The review of

our due diligence processes will continue to be extended using a risk-based approach during 2020 and beyond. During the year, we also continued our ongoing monitoring of the sales agents used across the Group. This included a review of the agent reporting, invoice data and commission calculation. Such reviews will remain a continuing part of our compliance programme.

#### Data protection

In 2019, we continued to review our approach to data protection, following the implementation of the EU General Data Protection Regulation (GDPR) in 2018 and other jurisdictional data protection legislation. Further due diligence was undertaken clarifying the data we control and process both globally and within Europe, the methods by which we do this, the security of the systems that hold our data and the assignment of responsibilities for managing data processes. The annual self-assessment GDPR audit was issued in May 2019, on the anniversary of GDPR implementation, and will continue to be issued in two-yearly intervals to assess and ensure continued compliance with data protection legislation. Another area of focus in 2019 was the upcoming changes in data protection legislation in California, Brazil and India. We are working with local teams to ensure that our approach to data protection is compliant with these changes.

The Data Protection Officer is responsible for raising awareness of data protection issues across the Group, supervising privacy impact assessments (PVAs) and training staff who undertake roles that involve the processing of data. During 2019, we conducted 11 PVAs covering operational procedures, HR data and compliance-related processes. Specific data protection training for global employees in Europe was also provided through e-learning.

#### Other due diligence

The Group continues to undertake focused, country and function-specific risk assessments, reviewing financial records and the quality of implementation of our policies and procedures, often engaging the assistance of external advisers. The outputs of these assessments are used to identify activities that require further attention, ensure that our Group policies and procedures for the management of anti-bribery and corruption risk continue to be appropriate for the business, and ensure that within our business there is the necessary awareness and understanding to be able to manage risks appropriately.

## Health and safety

# The Group is striving to become a best-in-class organisation for safety performance

We remain fundamentally committed to protecting the health and safety of employees, contractors, visitors, customers and any other persons affected by our activities.

Health and safety is identified as one of Vesuvius' key strategic objectives, and our commitment to health and safety is embedded throughout the organisation. Our ethos 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.

### Safety leadership

Safety performance remains the priority item on the agenda at all our Group Executive Committee and management meetings, and safety performance is reported to the Board by the Chief Executive as a matter of priority at each Board meeting. The Group Executive Committee reviews all of the more serious incidents, including all Lost Time Injuries, and the responses to these from local management. The Group remains fully committed to continuing safety improvement with a Group Health and Safety Policy stating a clear goal of:

- > No Lost Time Injuries
- > No repeat injuries
- > No harm to our people or contractors

### Our approach to health and safety is based on the following 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



### Safety Breakthrough

Safety Breakthrough is our global initiative to reduce the number of accidents, Lost Time Injuries and Dangerous Occurrences, and to increase safety awareness through greater employee engagement. Our aim is to raise health and safety performance to best-in-class levels throughout our business, attaining the lowest level of accidents within our industry sector with the target of reaching zero accidents throughout Vesuvius. This applies to all Vesuvius employees, whether working at one of our facilities or located on a customer site. The specific focus on customer location safety continues to yield results not only for our employees but also our customers' employees, helping to support the strong relationships built between customers and Vesuvius.

### 2019 – A fresh approach

Building on the improvements in the Group's safety performance over the past decade, the Board remains strongly committed to the belief that even one accident is too many and that further improvement is necessary. With the aim of becoming "best in class", the Group is committed to fundamentally rewriting the Group's safety agenda to refocus efforts on the achievement of the Vesuvius safety goals. To kick-start this process, the Chief Executive launched the Vesuvius 8 Core Safety Rules in 2019. These outline the basic safety responsibilities of each of our colleagues and will be rolled out across the organisation as the mandated practices for employee and manager conduct. In conjunction with this communication, the Group will be implementing procedures to enforce discipline. The Rules will be embedded into the contractual terms of all employees and all employees will be expected to report breaches and violations of the rules, with appropriate sanctions imposed whenever required.

#### 8 Core Safety Rules

1. I always wear mandated personal protective equipment
2. I only operate equipment or vehicles if trained and authorised
3. I do not remove, bypass or tamper with machine guarding and safety devices
4. I lock, tag and try before any intervention on a machine
5. I make sure all high-risk activities are covered by a Daily Permit to Work
6. I always ensure my fall protection is secure before working at height
7. Before entering a confined space, I check I will be able to breathe and escape
8. I only perform electrical work if certified and authorised

### Health and safety responsibility and accountability

The business units are directly accountable for their health and safety performance, with each business unit determining its own priorities and resource allocations. Health and safety performance is included in the objectives and linked to the remuneration of all senior managers. It is regarded as a core management responsibility, with executives and line managers directly accountable for health and safety matters in the operations under their control. This tone from the top is demonstrated by the requirement for all senior managers to perform executive safety tours, report on their findings to local operations management and follow up on improvement requirements. In this structure, all employees understand that they have a responsibility to take care of themselves and others whilst at work. We expect everyone to participate positively in the task of preserving workplace health and safety.

The Group Vice President HSE and Quality is responsible for setting the Group's policies for health and safety and controlling their application, with the business units taking full responsibility for their implementation and accountability for performance against them.

Every business facility has an appointed health and safety manager, who works with management and all employees to review site health and safety, assess training needs and develop and implement site safety improvement plans. These local health and safety managers are assisted by central experts who not only identify adverse trends and respond to them, but also enable the sharing of best practice across Vesuvius.

All site management teams must develop and implement Site Safety Improvement Plans, incorporating the identification and reduction of the site's main risks, compliance with the group safety standards, deployment of shop floor safety leadership practices and resolution of issues highlighted during Group Safety Audits. Improvement plans are now in place for all production sites with implementation being the direct responsibility of local managers. Any site experiencing a serious dangerous occurrence or medically treated injury is required to investigate using 8D methodology (see box); they must then incorporate findings into their site safety improvement plans and share their incident investigation and action plans across the Group.

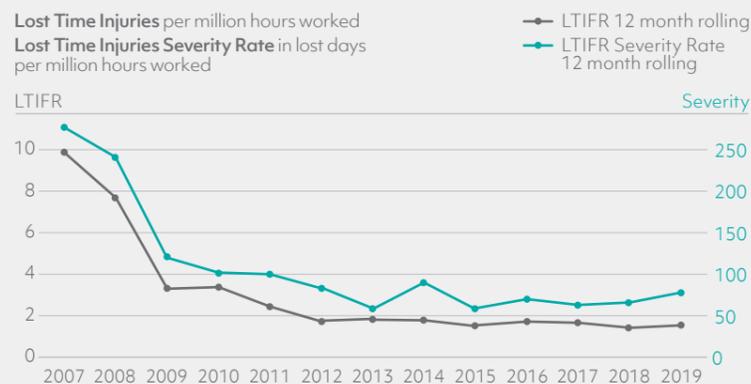
### Vesuvius 8D practical problem-solving methodology

The 8D methodology is implemented as the primary problem-solving tool across the Group. It is a consistent approach designed to identify root causes and ensure corrective action.

- D1 clarify the problem
- D2 grasp the current situation
- D3 contain and set target
- D4 analyse causes
- D5 define countermeasures
- D6 execute and track progress
- D7 check results
- D8 standardise and establish control

## Health and safety continued

## Safety performance in 2019



Safety performance in 2019 is detailed below:

Performance Indicators	Employees and directly supervised contractors	Third-party contractors	All employees and contractors
Work Related Death	0	0	0
Severe Injuries	0	0	0
Lost Time Injuries (LTIs)	36	4	40
Lost Time Injuries Frequency Rate (LTIFR)	1.45	3.39	1.54
Recordable Injuries	137	7	144
Recordable Injuries Frequency Rate (RFR)	5.51	5.93	5.53
Medically Treated Injuries (MTI)	188	10	198
Medically Treated Injuries Frequency Rate (MTIFR)	7.57	8.47	7.61
Total Number of Injuries	509	14	523
Injury frequency	20.49	11.85	20.10
Lost Time Incident Lost Days	2,020	0	2,020
Lost Time Incident Severity Frequency Rate (Lost Days)	78	0	78
Dangerous Occurrences (DO)	735	1	736
Dangerous Occurrences Frequency Rate	28.24	0.85	28.28
Safety Audits Number	113,303	0	113,303
Safety Audits per 20 employees per month	16	0	16
Employees participating in monthly safety audits	8,744	0	8,744
Employees participating in monthly safety audits %	74%	0%	74%
SIOPA	91,988	0	91,988
Other IOPA	30,602	0	30,602
IOPA total	122,590	0	122,590
SIOPA per employee	8	0	8
Other IOPA per employee	3	0	3
IOPA total per employee	10	0	10
Hours worked	24,845,061	1,181,091	26,026,152

All frequency rates are per million hours worked.  
IOPA: Improvement opportunities implemented with a permanent corrective action.  
SIOPA: Safety improvement opportunities implemented with a permanent corrective action.  
There were no safety incidents involving visitors to Vesuvius' operations in 2019.

## Accident and incident reporting and analysis

A significant investment in time and resources has been made over recent years to develop robust, comprehensive and timely reporting of incidents (including all fires, explosions and any material spill or other chemical releases). In our internal standards, we continue to use more stringent definitions for Lost Time Injuries (LTIs) and 'severe accidents' than the definitions used by many regulatory bodies. As the number of Lost Time Injuries sustained in the organisation fell, we introduced reporting on Medically Treated Injuries (MTIs) to maintain the focus on safety, with investigation extended to all serious Dangerous Occurrences and all MTIs.

In 2019, 40 LTIs were reported which resulted in 2,020 lost days and gave an LTI frequency rate for the year of 1.54, an increase versus the 1.3 recorded in 2018. 198 MTIs were reported in 2019 out of a total of 523 injuries reported, resulting in an MTI frequency rate of 7.61.

We have been actively encouraging the reporting of all dangerous occurrences and injuries as only through reporting, sound root cause analysis and preventative action plans can future occurrences be prevented. As a consequence, there was an increase in the number of Dangerous Occurrences reported in 2019 to 736 (2018: 649).

Vesuvius' investigation procedures are based on the 8D Practical Problem Solving ('8D') tool, which aims to identify the true root causes of incidents to prevent a repeat. Results are formally presented to management, with details of the 8D-based root causes and improvement actions cascaded throughout the organisation.

Based on the analysis of the kind of accident, type of injury and parts of the body affected, the businesses develop risk-based action plans that consider both the frequency and severity of incidents and track progress. Every site management team receives a monthly dashboard of health and safety-related performance indicators covering both lagging and leading metrics.

As part of management reporting, the Board receives a detailed monthly update on all Lost Time Injuries.

## Lead and lag indicators

In our plants in 2019, more than 70% of our working population performed routine safety audits every month, generating an average of more than ten implemented safety improvement opportunities per person from more than 8,700 employees, resulting in an improvement in worker safety. This 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.

Our Take 2 initiative ensures that employees think again before performing any unusual or non-standard activity. Simply stated, the employees take 2 minutes to discuss the task, any hazards and how to prevent accidents before any work is started. This process allows the team to consider and reflect on hazards and the controls required before work commences.

For new contracts in customer locations, we use a formal risk assessment which aims to identify significant risks to our employees and contractors. This enables appropriate control measures to be agreed and implemented with the support of our customers in advance of work commencing.

We continue to work hard to reduce incident severity and generate actionable insights from the performance indicators we capture. The lost time injuries frequency charts prepared monthly for each business unit and site show where injuries have been reduced and where further effort is required through a combination of behaviour-based approach to safety and the

implementation of physical safeguards. We focus on the safety of all personnel, whether they are employees, third-party contractors or visitors.

## Health and safety auditing

The Group operates a central safety auditing team of three auditors, each with more than 20 years' experience, who report to the Vice President HSE and Quality. 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. During 2019, the team conducted 85 audits visiting all manufacturing locations, all R&D sites and all customer locations with 40 employees or more, as part of a programme of systematic audits of all Group locations worldwide. Each audit also included an assessment of the site's HSE leadership. Following each visit, action plans were created by the site management teams to address any issues identified and work on completing these assessed on a regular basis. The first year of audits has resulted in a much greater understanding of the depth and range of the Group's health and safety expectations in our global facilities. The observations made during audits have been used to inform improvements to the Group's training programmes and the enhancement of the Group's health and safety standards. The Group HSE audit team reports the results of audits, as well as the progress of action plans addressing the most critical issues, to the Board.

## Health and Safety Policy and standards

All employees are required to adhere to the Group's Health and Safety Policy and Alcohol and Drug Policy. Copies of the policies signed by all members of the Group Executive Committee are translated into local languages and displayed prominently in all locations. The Alcohol and Drug Policy was updated during the year and reissued throughout the Group.

The Health and Safety Policy is supported with standards, procedures and ISO certifications, which are reviewed and updated on an ongoing basis. In 2019, new standards were created relating to high-risk activities, isolated and lone working, warehousing and racking, and the Group's standard on ergonomics activities was enhanced with the issue of a new standard specifically focusing on lifting and handling. In addition, the standards relating to Permit to Work, Lock, Tag and Try, and Machine Safety were reviewed and updated.

In addition, the findings and lessons learned from incident investigations are incorporated into updates to prevent any reoccurrence and new or improved standards are issued for implementation across the Group.

## Vesuvius health and safety standards

- > Accident & Incident Reporting
- > Business Continuity
- > Control of Contractors
- > Crisis Management & Crisis Communication
- > Ergonomics
- > Fork Lift Truck Safety
- > Gas
- > High-Risk Activities
- > Inspection Maintenance and Testing of Fixed Electrical Installations
- > Isolated and Lone Working
- > Legionella
- > Lifting and Handling
- > Lock, Tag and Try
- > Machine Safety
- > Permit to Work
- > Personal Protective Equipment
- > Risk Assessment
- > Road Vehicle
- > Safe Storage of Bulk Bags and Pallets of 25kg Bags
- > Warehousing Racking
- > Working Safely with Fibres



## Health and safety continued

## Vesuvius Health and Safety Policy

We will operate all work and business activities in a manner which ensures the health and safety of employees, contractors, visitors, customers and any other persons affected by these activities.

We will comply with the legal health and safety obligations.

We will be pro-active in preventing injuries and ill-health, and continuously improve our H&S systems and performance.

## Organisation and Responsibilities

We regard health and safety matters as a mainstream management responsibility. Executives and line managers are directly responsible for health and safety matters in operations under their control. Management is accountable for H&S performance against objectives.

All employees have a responsibility to take care of themselves and others whilst at work. We expect everyone to participate positively in the task of preserving workplace health and safety.

We will encourage our Suppliers to adhere to the same Health & Safety standards as we do.

This policy has been approved by the Group Executive Committee and is displayed and implemented at all facilities.

The Group Executive Committee  
Version 2.0.6, 10/2018

## Our Beliefs

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

## Our Aims

- > No Accidents
- > No Repeat Injuries
- > No Harm to People

## Our Commitments

- > Every business facility will follow the agreed H&S plans
- > We will thoroughly investigate any incident to learn, share and avoid repeats
- > Risk assessments will be undertaken to identify hazards, prioritise any deficiencies and correct them in an appropriate way as well as to develop appropriate safe work procedures
- > We will abide with simple and non-negotiable standards
- > We will provide training for all employees and contractors to ensure that they understand their responsibilities and are able to act accordingly
- > Every business facility will have an appointed H&S Manager

## Health and safety highlights

## Awards

In 2019, we distributed Safety Awards to 13 regions out of 46, as a recognition of their outstanding performance in the previous year. These regions completed 2018 without recording a single Lost Time Injury, recorded a participation of over 80% of employees in monthly Safety Audits and implemented more than ten improvement opportunities per person per year.

The composition of Vesuvius' safety regions was reviewed in 2019, increasing their average size and reducing their number to 40. Despite the greater difficulty due to larger headcounts, 12 districts ended 2019 with a clean record of zero Lost Time Injuries, 80% participation in Safety Audits and ten improvement ideas implemented per person per year.

In addition to our efforts to keep our employees and contractors safe, we take pride in sharing our safety management practices with our customers. In 2019, we received a wide range of customer awards globally, including the following:

Chile: CAP Huachipato, Safety award.

China: Shougang Group, Qian'an Steel company, recognition for Excellence in HSE team management leadership, showing how Vesuvius is driving safety leadership across all suppliers in this steel group. Baowu Group: Shaogang steel special safety management award.

India: Five major customers (JSW Vijayanagar, Tata Steel – KLR, ESSAR, Tata Steel – JSR, JSPL Angul) recognised the major contribution made by Vesuvius for workplace safety, safety initiatives and kaizen continuous improvement in their steelmills.

Thailand: Tata Steel, Vesuvius were awarded a 5 star subcontractor rating for safety management quality at customer sites. Safety campaigns were launched at Tata Steel sites demonstrating communication, implementation and safety visibility based on the high level of Vesuvius standards.

UK: Pledge Awards 2019, Individual Category Award for work on subcontractor vetting and Open Category award for Respirable Crystalline Dust Reduction on behalf of Installation Services UK.

## Training employees to work safely

Turbo S training pulls together all of our safety management practices. Using a train-the-trainer approach, Turbo S training sessions are tailored to the audience and their activities. For example, there is a special training course developed for employees at customer locations that focuses on the specific risks faced by these individuals. We conduct Permit to Work training in all Group facilities, including customer locations, which ensures that all non-standard work conducted in our facilities, whether by our employees or contractors, is the subject of a pre-commencement risk assessment and a formal permission to commence activity, setting out the safety requirements. We have developed machinery safety training with an outside industry leader, Pilz GmbH & Co, a company specialising in safe automation technology. Recognised best practices are extended throughout the Group through a series of machinery assessments and training programmes, with each site identifying and addressing the top five issues by severity as a matter of priority.

## Working in tidy plants

The continuing use of 5S, the workplace organisation method, throughout the Group has driven significant improvements in our workplace environment. Employees are encouraged to develop ownership of their working areas and take pride in their cleanliness and organisation. The added support of our lean specialists has been key to improving plant safety by removing hazards for employees and offering a clear, bright and safe working environment. Regular 5S audits led by team leaders ensure continuous improvement of working conditions and promote a safer workplace.

## Health and safety certifications

We have seven manufacturing sites (representing 13% of our manufacturing sites), one warehouse and three Vesuvius operations in customers certified to OHSAS 18001:2007/ISO 45001:2018. Vesuvius sites choose to certify based on local regulatory and customer requirements.

## Turbo S

Turbo S, as part of our Safety Breakthrough initiative, builds on the foundation of Safety Breakthrough and includes a strong focus on the standardisation of all our repetitive activities. Turbo S also integrates good management practices in the workplace, with a strong emphasis on developing an organisation that enables everybody to work to the same high standards in safety performance.

As part of the continuing Turbo S initiative:

- > Senior executives regularly lead safety tours at all locations
- > Severe accidents are formally reviewed by the Group Executive Committee
- > Employees are routinely engaged in safety audits
- > We invest significantly in safety training for all employees, irrespective of their role and function within our business
- > All employees are expected to routinely raise and implement safety improvement opportunities; we focus on the number of implemented ideas
- > Safety standards are continually updated, translated and deployed throughout the Group
- > All injuries and Dangerous Occurrences are analysed locally, with a formal presentation of findings, root causes and improvement actions cascaded through management



## 2019 Executive safety tours

Our executive safety tours engage senior management across all disciplines and functions in the observation of the Group's operations, encouraging dialogue with the staff and setting action points for discussion and implementation. These tours provide visible safety leadership on the shop floor in our sites and at our customer locations. They, along with our daily safety audits, are a pillar of our Safety Breakthrough initiative. In 2019, 135 Executive Safety Tours, of which five were in customer locations, were carried out by members of the Group Executive Committee and their direct reports.



## Training activities routinely undertaken for our employees and contractors include:

- |                                 |  |  |
|---------------------------------|--|--|
| > Arc Flash Hazard              | > General Health and Safety and refresher training | > Practical Safety in Steel Customers      |
| > Bike Safety                   | > Hand Hazard and Protection                       | > Radiation                                |
| > Control of Contractors        | > Hazard Perception                                | > Road Safety                              |
| > Crane Operation               | > Hazardous Goods                                  | > Safe Stacking                            |
| > Defensive Driving             | > Health and Safety Representatives                | > Safety and Environmental Auditing        |
| > Electrical Testing            | > ISO 45001:2018                                   | > Steel mill orientation                   |
| > Environmental Waste Reporting | > Legionella                                       | > Turbo S Safety and Safety Leadership     |
| > Ergonomics                    | > Lock, Tag and Try                                | > Warehouse Material Stacking and Handling |
| > Executive Safety Tour Leader  | > Incident and Performance reporting               | > Welding Certification                    |
| > Exoskeleton                   | > Machine Safety                                   | > Working at Heights                       |
| > Fire Fighting                 | > Permit to Work                                   |  |
| > First Aid                     | > PPE Safety                                       |  |
| > Forklift Truck                |  |  |
| > Gas Safety                    |  |  |

## Sustainability

# Our solutions improve the quality of our customers' products and reduce the environmental footprint of their processes

We continue our efforts to reduce energy consumption and waste generation in our manufacturing processes.

### Vesuvius and climate change

Vesuvius embraces society's expectations for greater transparency around climate change, expressed by initiatives such as the recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosures. Vesuvius' businesses focus on delivering solutions to help our customers improve the productivity of their operations and reduce their environmental footprint. According to estimates from the World Steel Association, on average for 2018, 1.85 tonnes of CO<sub>2</sub> were emitted for every tonne of steel produced, with the steel industry generating between 7% and 9% of direct emissions from the global use of fossil fuel. With around 10kg of refractory material required per tonne of steel produced, the careful selection and use of energy-saving refractories can beneficially impact on the net emission of CO<sub>2</sub> 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 the ratio of metal in finished castings to metal melted.

With respect to our own operations, the Board recognises that good environmental management is aligned with our focus on cost optimisation and operational excellence. Whilst Vesuvius' products vary significantly in the energy intensity of their manufacture, the majority of our manufacturing processes are not energy intensive nor do they produce large quantities of waste and emissions. Two of our 33 main manufacturing processes (VISO and Dolime production) account for 39% of our energy consumption and 57% of our CO<sub>2</sub>e emissions. (We report in kg of CO<sub>2</sub>e equivalent (CO<sub>2</sub>e).) A further four processes consume 25% of the Group's total energy consumption and represent 17% of

our CO<sub>2</sub>e emissions, giving a clear focus for energy and emissions savings.

The Group has clear targets for energy saving, with ongoing efforts focused on increasing the efficiency of our production processes. Dolime production, which uses coal to calcine dolomite, is a major emitter of CO<sub>2</sub> and, building on the successes of previous years, continues to be a clear focus for our investment to reduce CO<sub>2</sub> emissions.

Vesuvius' total energy costs of £34.8m are less than 3% of revenue, with only 1.5% of the total energy requirements across the Group consumed in the UK.

The following completed initiatives demonstrate just some of the ways in which Vesuvius has already secured energy savings and reduced its environmental footprint:

- > Air compressor upgrades in Bayuquan, Muggio and Tamworth
- > Air conditioning controls in Ras Al Khaimah upgraded to reduce energy consumption
- > Electrical supply stabilisation in Rio de Janeiro
- > Forklift truck modernisation in Ping Tung
- > Heat recuperation in Ostend
- > Kiln and oven controls in Bayuquan, Changshu, Kua Tang and Sadat City upgraded to reduce energy consumption
- > LED lighting coupled with PIR in Cleveland, Enschede, Ghlin, Grossalmerode, Hengelo, Kreutzal and Piedade
- > Motor transducers in Bayuquan
- > Process equipment design in Muelheim and Vizag
- > Roof mounted solar panels in Bulli and Ghlin

Vesuvius operates sites in several developing markets where environmental concerns have become politically significant, as air quality deteriorates, and residential expansion takes people closer to areas historically reserved for manufacturing. Environmental compliance at our sites, reduction in waste,

increased recycling and treatment of emissions are now key to Vesuvius' operations, and can be a significant differentiator for our business. Correctly managed, these issues will deliver social, environmental and economic benefits to the Group and to our wider stakeholders.

### Our customers and their processes

Under the Vesuvius and Fosco brands, we deliver a wide range of solutions that help our customers improve the productivity of their operations. These solutions also improve the quality of our customers' products and reduce the environmental footprint of their processes.

Thermal optimisation and reject reduction are key factors in the efficiency of the processes for which we supply solutions. We contribute to the reduction of our customers' energy usage and subsequent CO<sub>2</sub> emissions through insulating materials, metal flow management, facilitating extended manufacturing sequences (meaning less reheating) and reduced downtime.

### How does Vesuvius contribute?

We offer energy-efficient solutions in our portfolio of products and services and support the deployment of energy-efficient and sustainable solutions engineered by our technology departments.

Vesuvius products and services facilitate environmental benefits by:

- > Enabling lighter, thinner and stronger components, leading to lighter vehicles and less energy consumption
- > Improving customer processes through the supply of innovative consumables to reduce energy intensity and the CO<sub>2</sub>e intensity ratio
- > Reducing customers' refractory usage per tonne of steel produced through higher-quality, longer service-life products
- > Increasing the level of sound castings produced per tonne of metal melted through improved mould design and the application of molten metal filtration and feeding systems

### Vesuvius' energy consumption and emissions

Whilst the 2019 normalised energy consumption in kWh per metric tonne increased relative to the previous year, it remains lower than the 2017 value. This change and the 10.8% decrease in the amount of energy consumed resulted primarily from changes in production volumes (-13%) and in production mix. Natural gas use decreased by 11.8% and electricity use decreased by 2.0%. Coal consumption by weight decreased by 14.9%, from 36.4 thousand metric tonnes in 2018 to 31 thousand metric tonnes in 2019. In 2019, the Group also consumed 362 cubic metres of diesel in the operation of forklift trucks on its sites and 167 cubic metres of fuel oil.

Although normalised CO<sub>2</sub> emissions rose by 0.9%, thanks to this improved energy mix and global energy consumption decrease, the absolute CO<sub>2</sub> emissions were reduced by 12%.

The table below details the fuel consumption for the main fuels consumed across the Group in 2019

Category	Energy used MWh 2019	Energy used MWh 2018	% change	CO <sub>2</sub> e m kg 2019	CO <sub>2</sub> e m kg 2018	% change
Coal	230,090	274,684	-16.2%	76.4	89.2	-14.4%
Electricity	209,985	214,195	-2.0%	106.2	111.3	-4.6%
External Heat	3,383	3,992	-15.3%	1.1	1.2	-11.9%
LPG	66,373	70,389	-5.7%	14.2	15.1	-5.7%
Natural Gas	645,131	731,273	-11.8%	118.6	134.5	-11.8%
Non Fuel Emissions	0	0	0.0%	106.6	129.5	-17.7%
<b>Total<sup>1</sup></b>	<b>1,154,962</b>	<b>1,294,533</b>	<b>-10.8%</b>	<b>423.1</b>	<b>480.8</b>	<b>-12.0%</b>

All fuel consumption is converted to MWh for reporting.

1. Total reflects total of those fuels identified, not total consumption of all fuels in the Group as data for some minor forms of fuel use are not currently collated.
2. In 2019, the Group consumed 58,648 thousand m<sup>3</sup> of natural gas.

### Environmental monitoring

All our factory emissions are proactively managed in accordance with local regulations. Regular analysis enables us to act to reduce our emissions where possible and to operate more efficiently. The Group monitors its energy consumption, worldwide CO<sub>2</sub>e emissions and usage of water. Vesuvius proactively seeks to reduce waste in production and to reuse and to recycle materials where practical.

In 2019, Vesuvius recorded 21 minor environmental incidents. Of these, three related to emissions to air, three to emissions to water and three to ground contamination. Total spills across the Group in 2019 are estimated to have totalled only 650kg. Where incidents occur, they are contained via Vesuvius' site environmental response plans and reported through the Vesuvius incident

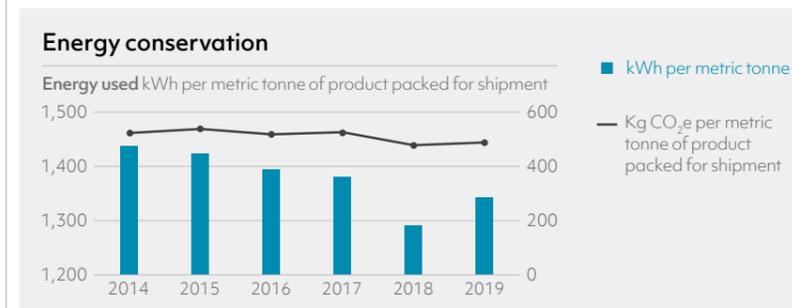
reporting system. We comply with local reporting requirements in respect of such incidents. No action was taken by any authority in relation to any incident in 2019.

### Energy Conservation Plan

The Vesuvius Energy Conservation Plan was launched in 2011 with the objective of reducing our normalised energy consumption. In 2015, the Group set a target to reach a 10% improvement by 2018; this was surpassed with a 2015-18 10.2% improvement. The Board has now agreed a further objective targeting an additional 10% improvement by 2024.

Managing our energy intensity not only has an environmental benefit but is also part of our long-term strategy to enhance our cost-competitiveness.

In 2019, the Group used 1.323 MWh per metric tonne of product packed for shipment.



### Government of Chile, Gold Award in Energy Efficiency

Vesuvius Chile received recognition as an important partner in the innovative CAP Acero Huachipato Team for molten steel flow control energy efficiency.



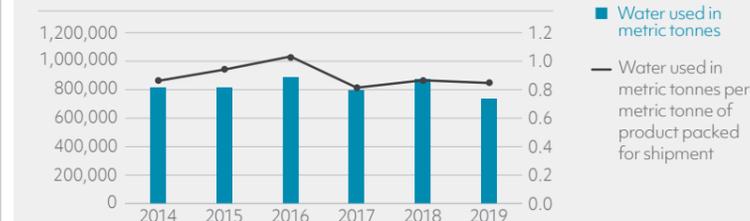
## Sustainability continued

## Water conservation

Vesuvius works to reduce the consumption of water in its manufacturing processes by recycling and improving water management processes. No saltwater or cooling water is abstracted. As with energy use, normalised consumption of water varies with product mix. In 2019, there was a slight decrease in absolute water consumption, and a decrease in

normalised water consumption – that is water use per tonne of product manufactured – reflecting changes in product mix and product packed for shipment (some shipped products contain water). The Board has set a goal for the Group to reduce the amount of waste water by 25% by 2024.

## Water conservation



## Environmental Policy

All employees are expected to adhere to the Group's Environmental Policy, which is translated into local languages and displayed prominently in all locations. The Policy is supported with standards and procedures which are reviewed and updated on an ongoing basis. See facing page for more information.

## Water consumption

Year	Water in m3	Water in m3 used per metric tonne of product packed for shipment
2014	818,613	.862
2015	818,077	.941
2016	886,702	1.033
2017	798,375	.814
2018	873,340	.867
2019	738,871	.842

## Material waste

In 2019, Vesuvius implemented a comprehensive quarterly reporting system for material waste by all manufacturing sites. It includes the reporting of waste to landfill, hazardous waste, waste for recycling and waste to sewers.

Following analysis of the results, action plans are being implemented at a series of pilot sites during 2020, with the ultimate objective to extend the programme throughout Vesuvius based on lessons learnt at these plants. Alongside the waste reporting, the Group has started

monitoring the amount of recycled materials that are consumed in our processes, with a view to better understanding the actions being taken to utilise recycled materials and the extent to which such usage can be increased throughout the Group.

## Greenhouse gas reporting

In line with changes in plant geography, product mix and product packed for shipment, total emissions decreased but normalised emissions increased in 2019. Our greenhouse gas ('GHG') emissions are limited to CO<sub>2</sub>, with emissions of other GHGs (Methane Emissions, Direct N<sub>2</sub>O Emissions, Direct Sulphur Hexafluoride Emissions, Direct Methane Emissions in CO<sub>2</sub> equivalent, Direct N<sub>2</sub>O Emissions in CO<sub>2</sub> equivalent, Direct HFC Emissions in

CO<sub>2</sub> equivalent, Direct PFC Emissions in CO<sub>2</sub> Equivalent, Direct SF<sub>6</sub> Emissions in CO<sub>2</sub> equivalent) all not significant.

In reporting GHG emissions, we have used the GHG Protocol Corporate Accounting and Reporting Standard (revised edition) methodology to identify our GHG inventory of Scope 1 (direct) and Scope 2 (indirect) CO<sub>2</sub>e. We report in kg of CO<sub>2</sub> equivalent (CO<sub>2</sub>e).

The Group also meets all its obligations in relation to the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme, the Producer Responsibility Packaging Waste regulations and the Energy Saving Opportunity Scheme by which the UK has implemented the EU Energy Efficiency Directive.

Global GHG emissions (kg of CO<sub>2</sub>e)

	2019	2018
<b>Emissions source</b>		
Combustion of fuel and operation of facilities (Scope 1)	318m	370m
Electricity, heat, steam and cooling purchased for own use (Scope 2)	107m	113m
Total GHG emissions	425m	483m
Change	-12.0%	
<b>Vesuvius' chosen intensity measurement (kg of CO<sub>2</sub>e per metric tonne of product packed for shipment)</b>		
Emissions reported above, normalised to per tonne of product output	483.8	479.2
Change	0.9%	

**Methodology** 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.

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

We have used data gathered to fulfil our requirements under the CRC Energy Efficiency scheme and emission factors from the UK Government's and the IEA GHG Conversion Factors for Company Reporting 2019 in the calculation of our GHG.

## Vesuvius Environmental Policy

We will operate all work and business activities in a manner which ensures appropriate care and protection of the environment.

We will comply with all applicable legal and other local environmental obligations. We will be pro-active in preventing negative effects to the environment, and will continuously improve our environmental management systems and performance.

## Organisation and Responsibilities

We regard environmental matters as a mainstream management responsibility. Executives and line managers are directly responsible for environmental matters in operations under their control. Management is accountable for environmental performance against objectives.

Each and every employee is responsible and accountable for environmental matters in activities under their control.

We will encourage our Suppliers to adhere to the same Environmental standards as we do.

We expect everyone to participate positively in achieving our environmental aims.

## Our Beliefs

- > Preserving the Environment is Good Business
- > All employees must contribute to protect the environment
- > All environmental incidents are preventable

## Our Aims

- > Reduce waste at source and during production
- > Minimise consumption of energy, water and other resources
- > Minimise releases of substances which could adversely affect humans or the environment

## Our Commitments

- > We will raise environmental issues at all levels and openly address them
- > We will build environmental protection into our products and processes
- > Environmental risk assessments will be undertaken to identify hazards, prioritise any deficiencies and correct them in an appropriate way as well as to develop appropriate procedures
- > We will provide training to all employees and contractors to ensure that they understand their responsibilities and are able to act accordingly
- > Every business facility will have an appointed Environmental Manager

This policy has been approved by the Group Executive Committee and is displayed and implemented at all facilities.

**The Group Executive Committee  
Version 2.0.7, 10/2019**

## Certifications

We have 21 manufacturing sites certified to ISO 14001:2015, representing 39% of our manufacturing sites. Local management makes the decision on whether to certify their site based on local regulatory and customer requirements.

Country	Company name	Site
Australia	Foseco Pty Ltd	Sydney
Belgium	Vesuvius Belgium N.V.	Ostend
Brazil	Foseco Industrial e Comercial Ltda	Sao Paulo
China	Vesuvius Advanced Ceramics (Anshan) Co., Ltd	Anshan
China	Vesuvius Advanced Ceramics (Suzhou) Co., Ltd	Suzhou
Czech Republic	Vesuvius Česká Republika, a.s.	Trinec
Germany	SIR Feuerfestprodukte GmbH	Siegen
Germany	SIR Feuerfestprodukte GmbH	Kreuztal
Germany	Vesuvius GmbH	Grossalmerode
Germany	Vesuvius GmbH	Borken
India	Foseco India Limited	Puducherry
India	Foseco India Limited	Pune
Indonesia	P.T.Foseco Indonesia	Jakarta
Japan	Foseco Japan Limited	Toyokawa
Netherlands	Foseco Nederland BV	Hengelo
Poland	Vesuvius Poland Sp. z o.o.	Skawina
South Africa	Vesuvius South Africa (Pty) Limited	Olifantsfontein
South Korea	Foseco Korea Limited	Gyeonggi-do
Sweden	Vesuvius Scandinavia AB	Amal
Taiwan	Foseco Golden Gate Co. Limited	Ping Tung
United Kingdom	Vesuvius UK Limited	Tamworth

## People and community

# We continue to invest in career development and talent management

We believe that the personal growth and job satisfaction of our employees is key to the success and growth of our business.

Our objective is to support and drive a high-performance culture leading to better business outcomes delivered by a cadre of truly engaged employees. We do this by building broad organisational understanding of our strategy, goals and accountability, supported by our CORE Values, continuous improvement and positive management behaviours. We also foster a working environment that is inclusive and diverse, where people can be themselves without fear of harassment, bullying or discrimination.

Our leaders take responsibility for managing and developing their teams. They are provided with access to a central resource, offering expertise in Global Rewards & Mobility, Talent & Performance Management, Culture and Learning, and supported by Group-wide processes and information systems. We have implemented best-in-class talent development programmes for high potentials and we collaborate with market-leading learning institutions to deliver this.

The Group Executive Committee holds direct responsibility for the top managers, jointly reviewing capability needs and deciding on development, succession and cross organisational moves for this

leadership group. This illustrates the strong commitment at the highest level of our organisation towards growing the Group using its Company-wide resources.

We employ individuals who embody an entrepreneurial mindset and an international outlook. Whether they are recent graduates or seasoned professionals, everybody who wants to leave their mark in a dynamic rapidly developing business environment has a chance to succeed. Special attention is paid to building strong, diverse teams that bring different backgrounds and experiences to our daily work. The team of top leaders currently consists of 25 nationalities located in 24 countries. Details of the Group's gender diversity are contained in the Nomination Committee Report on page 99 and are incorporated into this Strategic Report by reference.

The Company invests in a constant dialogue with employees at various levels, using a mix of traditional communication channels, such as posters and websites, as well as modern digital solutions, such as mobile applications. Feedback mechanisms are built into our processes, so that we can capture the spirit of our workforce and the best ideas of our employees.

### Our training programmes

#### ADVANCE

This is a first-generation management development programme aimed at developing individual contributors who are likely to occupy a line management role and managers who need to be familiar with a broad range of people management skills to use in projects.

In 2019, we ran the second cohort across all regions. The programme is designed to last six months and blends learning approaches, using online, face-to-face and project-based techniques. Participants are supported by line management and HR business partners for the duration of the programme and meet twice face to face at a central location. During the final meeting, participants present their project findings to senior management, including a proposal for implementation of their findings in the business.

#### WINGS

This is the Vesuvius middle management development programme aimed at those who manage other managers. Wings is an established programme in partnership with Vlerick University, Belgium. The programme introduces general management theory and practice and encourages managers to explore their leadership styles.

#### ASCENT

This is the Vesuvius high-potential and senior leadership development programme which was developed in partnership with INSEAD.

It is aimed at accelerating the development of top talent within the organisation and developing skills such as strategic business leadership, general business administration, value innovation and performance culture development. The programme takes place over a nine-month period, and involves initial online modules, face-to-face workshops and

individual and group projects, in which participants are assessed individually for further development. Participants are individually sponsored by members of our Group Executive Committee, and actively supported by their line managers and by senior HR management for the duration of the programme.

#### HeaTt

These courses form part of the Vesuvius Technical University 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, 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.

# We are Machinists Technicians Enablers Manufacturers

Luis Flores  
Operator in Plastics  
Chicago Heights, USA



### Employee consultation and industrial relations

In most of the countries in which we operate, we inform and consult local works councils and trade unions in matters concerning the Vesuvius business. These processes and procedures are regulated by local law and we find that the constructive dialogue that takes place between employee representatives and management provides benefit to our business.

In addition to local employee representation, we operate a European Works Council (EWC) that contains representatives from each of the EU countries where Vesuvius has employees. European management and the EWC meet formally once a year. At this meeting, management provides an update on the performance of the business, with a focus on the developments likely to impact European employees. Additional Special Event Meetings are held when the Group is required to consult with the EWC about particular matters, including proposed restructurings in the European organisation. The EWC Select Committee also meets twice a year to receive additional updates, and the Chief HR Officer of Vesuvius joins part of these meetings. All EWC representatives receive two dedicated training days per year, to ensure that they are appropriately equipped to fulfil their duties. In addition to formal discussion and consultation mechanisms, in many countries our operations hold 'town hall' meetings on a regular basis. These provide an opportunity for local management to meet with staff and provide an update on corporate developments and matters material to the business.

## i engage

### Engagement with the workforce

In 2019, Vesuvius launched its first global Employee Culture & Engagement programme, i-engage, which included a survey open to all our employees. Over 90% of our people took part in the survey. Confidential and anonymised reports were then provided to team managers and site leaders who, with the involvement of their teams, have been developing and implementing action plans to address some of the issues identified from the survey.

We have focused our action plans not on the pure statistics, but on bringing about meaningful change in line with our CORE Values of Courage, Ownership, Respect and Energy. For example, much of the action taken has resulted in improved communications between managers and their teams and on greater cross-functional understanding and collaboration, all of which are key to the principles of our CORE Values.

### GEC action commitments

**i engage**

- 1** We will communicate more frequently and encourage feedback: We recognise how critically important it is for everyone to have a good understanding of Vesuvius' overall goals, objectives and business strategy.
- 2** Always explain the 'why': We are committed to always seeking to explain the context and the rationale behind the reason decisions are taken and ensure these are consistently communicated.
- 3** Work to promote co-operation and working together: We will lead by example and to ensure the different parts of Vesuvius cooperate with each other in the interest of the company as a whole.
- 4** Adopt and encourage active listening and promote fearless engagement: We will foster an environment for people to voice their opinions freely - everyone should feel free to speak their mind without fear of negative consequences.

## People and community continued



**Living the Values Awards 2019**

Our CORE Values – Courage, Ownership, Respect and Energy – are central to the culture we are building at Vesuvius. By living these Values, we will create a truly entrepreneurial culture that puts our customers at the centre of everything we do. One of the ways we encourage and recognise colleagues who display our values is our Living the Values Awards.

In 2019, we received over 750 nominations for our Regional Living the Values Awards, which were announced in August 2019 and were followed by the Global Living the Values Awards, which were announced at a special ceremony in Lisbon in December 2019. Chief Executive Patrick André paid tribute to finalists, saying that they provided a remarkable example of what can be achieved by being true to the CORE Values.

## Talent management

Strengthening the leadership pipeline and facilitating people development throughout the organisation remain key areas of focus for Vesuvius. In 2019, we continued 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. To develop a focused, performance-oriented culture as well as support the entrepreneurial drive, we align our senior management in their strategic business outlook and performance goals across all operational and functional business areas.

We encourage and reward high performance, foster talent and aim to create an environment where all can realise their individual potential. To meet the demands of the business and add rigour to our employee value proposition, we have launched several training programmes to assist our employees to develop their skills and progress their careers.

## 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. Our reward systems are designed to create a market-competitive and fair pay environment for all our employees and to reinforce the vision, strategy and expectations set by the Board.

We seek to create a culture that champions performance, building a strong link between individual performance and pay. Supported by our online people management platform, 'MyVesuvius', performance reviews and subsequent reward decisions are based not only on how employees have performed against their individual objectives but also on assessments of behaviour and commitment to our CORE Values.

Our global job grading framework, based on a structured assessment methodology, enables us to compare roles and ensure internal consistency throughout the organisation. We are committed to creating reward and performance management systems which are transparent and objective, where employees receive equal pay for work of equal value, regardless of their age, race, disability, sexual orientation, gender, marital, civil partnership or parental status, religion or beliefs. 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 decisions based on long-term goals rather than short-term gains and works to align the interests of participants and shareholders.

## Global mobility

Vesuvius is active 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.

Vesuvius expatriates do not come from one or two countries alone. We have a truly international mix of nationalities in our expatriate population. Individuals move not only within a region, but also between regions, with existing assignments including Malaysia to China, China to Germany, Poland to the USA and Brazil to China. Our mobility programme shows that our expatriate population is as diverse as our Group.

Vesuvius operates a number of international assignment policies to provide for the different circumstances of these assignments – whether they be short-term, longer-term or require extended commuting. These policies are supplemented with clearly identified benefits, delivering support appropriate to the nature of the assignment. By accessing this broad range of policies, we can manage our international assignments with greater flexibility, thus catering for changing expectations and demands from employees, whilst at the same time meeting the needs of the business.



## Vesuvius International Scholarship Programme

The Vesuvius International Scholarship Programme is set up to assist qualified dependent children of Vesuvius employees in helping to finance undergraduate and graduate education at accredited institutions. Awards are granted without regard to race, colour, creed, religion, sexual orientation, age, gender, disability or national origin.

Vesuvius has been involved in this programme for 25 years, during which period it has paid out \$2,085,000 to assist 3,670 students in achieving their higher education goals. Individual scholarships have been awarded to employees' children living in: Australia, Belgium, Brazil, Canada, China, the Czech Republic, France, India, Indonesia, Italy, Malaysia, Mexico, the Netherlands, the Philippines, Poland, Romania, South Africa, South Korea, Spain, Turkey, UAE, USA and the UK.

In line with our sustainability ambition to support education, we have decided to change the scope of the programme going forward in such a way that it will focus on emerging countries around the world. There will be fewer but larger awards given to children of the more junior staff in the organisation. We believe that by making significant awards to children who, without these grants, would not have been able to follow higher education, we can contribute significantly to enabling those children to improve their future.

## Key rationale behind international assignments

Vesuvius considers individuals for international assignment for three primary reasons:

- > **Providing Vesuvius companies with skills that are not locally available and that are required at short notice.** This typically occurs in countries where we are establishing a new presence. The number of expatriates working on this basis diminishes over time as the organisation matures and we recruit and train local talent to take over
- > **Enhancing diversity.** Management teams benefit from having a mix of gender and cultures. In specific cases, we use international assignments to achieve this goal
- > **Career development.** We believe that the personal development plan of any employee being developed for a senior management or senior expert position should include a posting outside their home country. This encourages them to develop the skills necessary to function successfully in an international environment. These postings are tailored to the needs of the organisation and the needs of the individual

## People and community continued

Vesuvius in the  
community

Vesuvius is committed to making a positive contribution to the communities in which we work by supporting a wide variety of fundraising and community-based programmes around the world. Below are some details about a selection of the community programmes our colleagues were involved in throughout 2019.

Going forward, we plan to increase the focus of our community activities on two areas which we are especially passionate about:

- > Educational opportunities for children and young people in less developed countries and from disadvantaged backgrounds
- > Encouraging more girls and women into scientific and technical fields of education

In 2020, wherever possible and practical, we are encouraging our people to dedicate their efforts to those areas.



## Cleveland Foundry team support food bank

The Cleveland Foundry team are very active in supporting their local community and wrapped up their 2019 charitable commitments by raising funds and volunteering at Harvest for Hunger, Cleveland Food Bank. The volunteer hours consisted of assembling and cooking hot meals, packing lunches, and picking and palletising emergency centre shelters. Harvest for Hunger is one of the largest

annual, community-wide food and funds drives in the USA, providing critical resources to local hunger relief organisations in Northeast and Central Ohio.

The team were also involved in a number of other activities during the year, including raising funds to assist a local charity to build homes for underprivileged families, and to support an animal adoption programme.

India Foundry team run  
for hope

Vesuvius Foundry India, Pune took part in the 10th edition of Runathon of Hope, organised by the Rotary Club of Nigdi, Pune. Runathon of Hope is a half-marathon which, in the past ten years, has generated funds used to bring hope to thousands. This has included funding surgical procedures, building sanitary facilities and providing Education Learning Kits to schools.

Feignies colleagues  
stage Pink Walk

Vesuvius employees around the world have supported Pink October Breast Cancer Awareness month for many years, and 2019 was no exception with fundraising activities taking place in a number of our sites.

For the fourth year in a row, employees at our Feignies site in France got involved, staging a Pink Walk with dozens of colleagues taking part to raise funds for research and support programmes.

Vesuvius Turkey helps  
children visiting women's  
prison

In September 2019, Vesuvius Turkey employees visited the Gebze Women's Prison to support a programme that helps mothers in prison stay in touch with their children. There is a kindergarten next to the prison for children up to six years old.

Our employees spent the day in the kindergarten and donated stationery products, clothing, baby shampoo, nappies and toys. Institutions such as this rely heavily on charitable support, particularly for the products our colleagues donated.



## Living the Values Awards selected charities

One of the key elements of Vesuvius' Living the Values Awards is offering winners the chance to donate £1,000 to a charity close to their hearts. Here are some of the worthy recipients selected by LTV Award winners:

- > **Society for the Protection of Children in India:** The charity looks after around 250 underprivileged female children. In a residential setting, they teach them how to be self-sufficient, by providing education and training on extra-curricular activities like dancing, singing and drawing. The donation will benefit their common fund.
- > **The Hydrocephalus Association (USA):** The donation will be used to support innovative research and the provision of support, education and advocacy for individuals and families dealing with hydrocephalus.
- > **The Yingkou Bayuquan Wang Hai School in China:** A village school, in the local countryside, which provides education for many children from less advantaged families. The donation will be used for nutritious lunches for these children.
- > **AT (Ataxia Telangiectasia) Children's Project (USA):** ATCP supports patients and their families, and raises funds for research of Ataxia Telangiectasia, a rare and fatal genetic disease that attacks children. The donation will be allocated for both research and supporting patients/families of Ataxia Telangiectasia.

The Strategic Report set out on pages 1-73 contains a fair review of our businesses, strategy and business model, and the associated principal risks and uncertainties. We also deliver a review of our 2019 performance and set out an overview of our markets and our stakeholders. Details of our principles, and our people and community engagement, together with our focus on safety, are also contained in the Strategic Report.

Approved by the Board on 27 February 2020 and signed on its behalf by

**Patrick André**      **Guy Young**  
Chief Executive      Chief Financial Officer