

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Please note that on 6 April 2020, the Board of Vesuvius plc announced that it had withdrawn its recommendation to pay the final dividend for 2019 of 14.3 pence per share which is detailed in this Annual Report.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 basis¹

Trading profit²

£181.4m

2018: £197.2m
–8.0% on a reported basis
–9.0% on an underlying basis¹

Return on sales²

10.6%

2018: 11.0%
–40 basis points
–40 basis points on an underlying basis¹

Profit before tax

£118.6m

2018: £156.2m
24.1% decrease

Headline earnings per share³

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 debt²

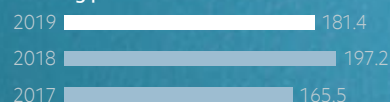
£245.8m

1.1x net debt to EBITDA ratio⁴
2018: £247.8m – 1.0x

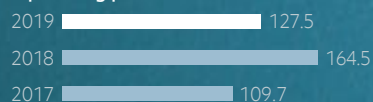
Revenue £m



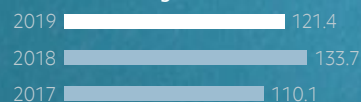
Trading profit² £m



Operating profit £m



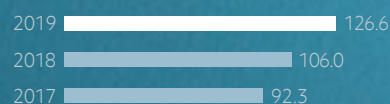
Headline earnings^{2,3} £m



Statutory EPS p



Free cash flow² £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

Juan Contreras
Precast Group Leader,
Chicago Heights, US



<p>Vesuvius at a glance Where we operate</p> <p>➤ See p4</p>	<p>Business model What we do</p> <p>➤ See p20</p>
<p>Our strategy Our aims and execution priorities</p> <p>➤ See p14</p>	<p>Our external environment How we are helping to tackle climate change</p> <p>➤ 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



Find out more at
report2019.vesuvius.com



Our business

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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.

➤ See our **Business model** on p20

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

Our global presence

41

Countries

10,496

Employees

6

Continents

79

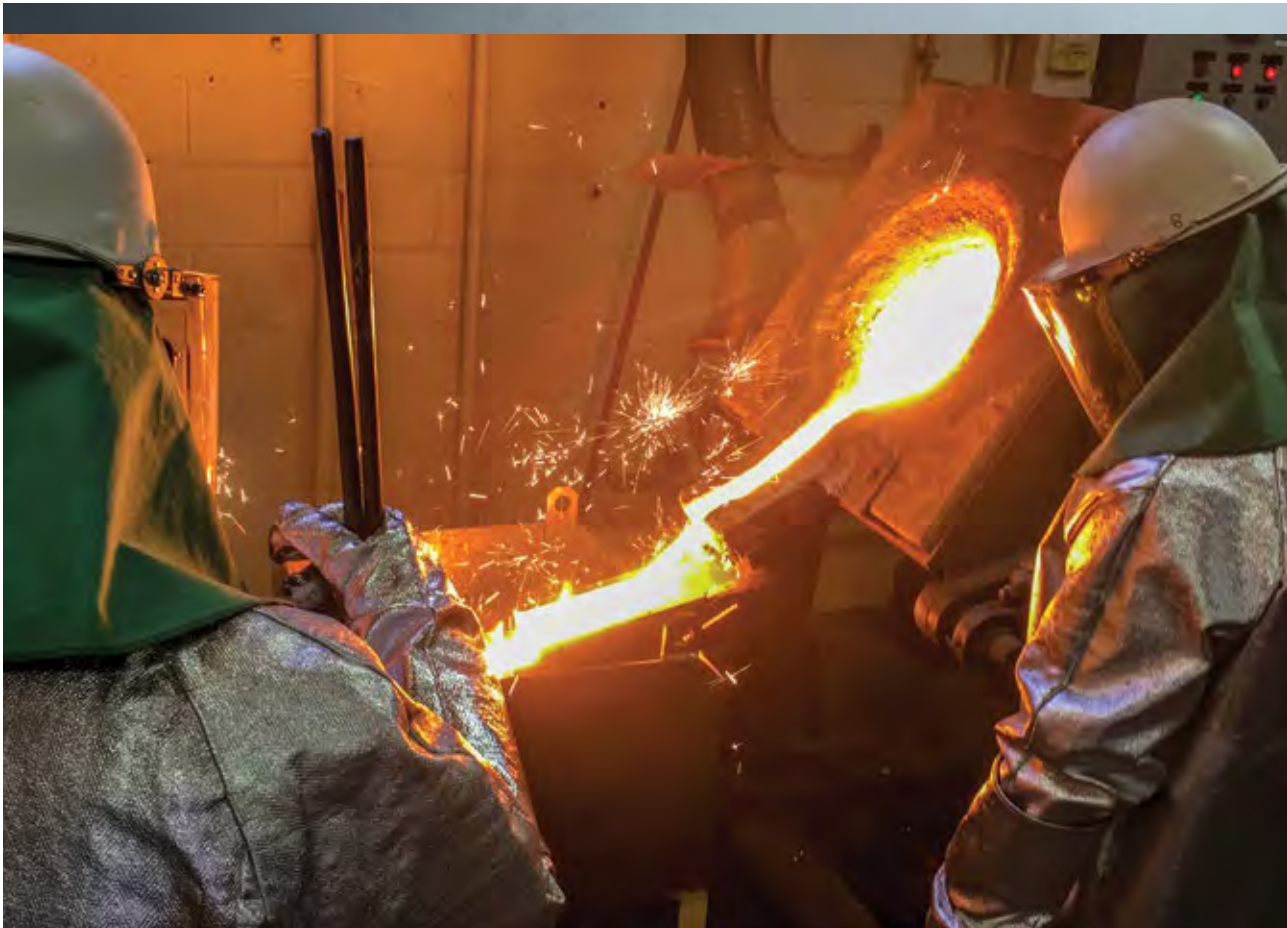
Sales offices

54

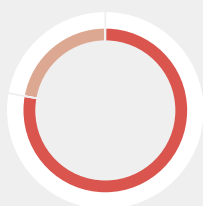
Production sites

6

R&D centres of excellence



Americas



£530.2m

Revenue
(2018: £527.0m)

● 78% Steel
● 22% Foundry

17

Production sites

1

R&D centre of
excellence

3,012

Employees

20

Sales offices



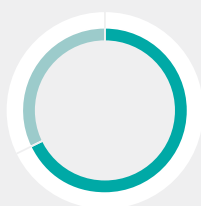
The map shows our
production, R&D
and commercial
sites worldwide



Steel Flow Control
Operating review

➤ See p44

EMEA



£699.8m

Revenue
(2018: £786.4m)

● 68% Steel
● 32% Foundry

18

Production sites

3

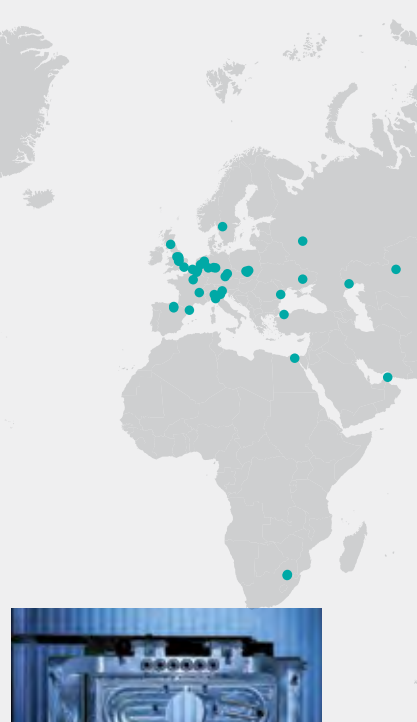
R&D centres of
excellence

4,196

Employees

30

Sales offices



**Steel Digital Services
(Sensors & Probes)**
Operating review

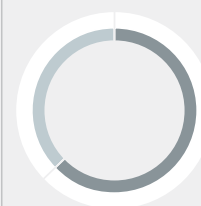
➤ See p49



Steel Advanced Refractories
Operating review

➤ See p47

Asia-Pacific



£480.4m

Revenue
(2018: £484.6m)

● 63% Steel
● 37% Foundry

19

Production sites

2

R&D centres of
excellence

3,288

Employees

29

Sales offices



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

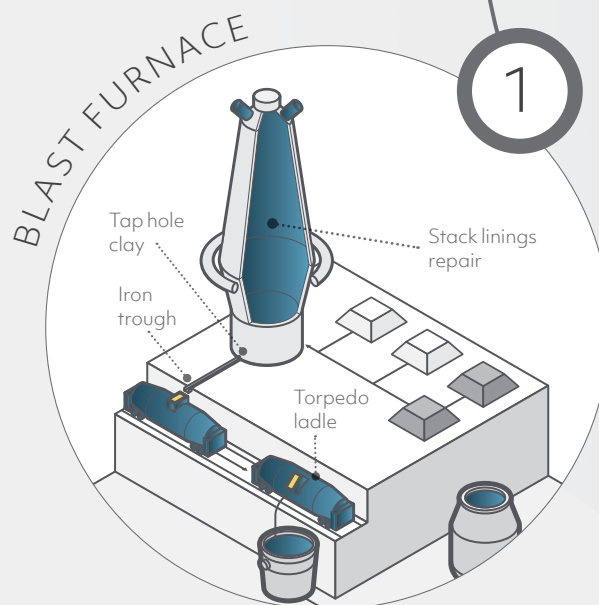
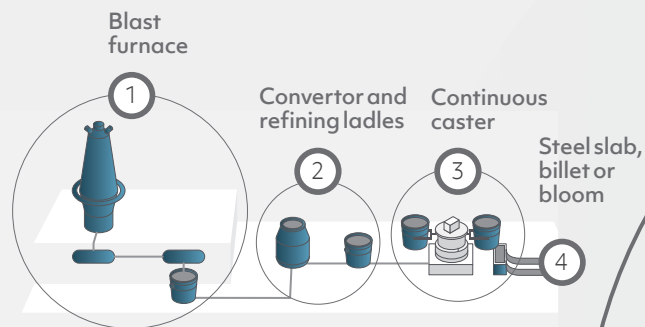
Overview

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



CONVERTOR AND REFINING LADLES

2

Convertor
linings and
repair

Refining
ladles

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

3

CONTINUOUS CASTER

Linings,
bottoms

Slide-gate,
tube changer

Ladle

Purging
plug

Tundish

Robotic
arm

Flux

Ladle
shroud

Linings

Tundish
slide-gate

Stopper
and rigging

Temperature
measurement

Robotic
arm

Mould

Flux

Tundish tube
changer

Impact
pad

Mould level
control

4

Steel slab, billet or bloom

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

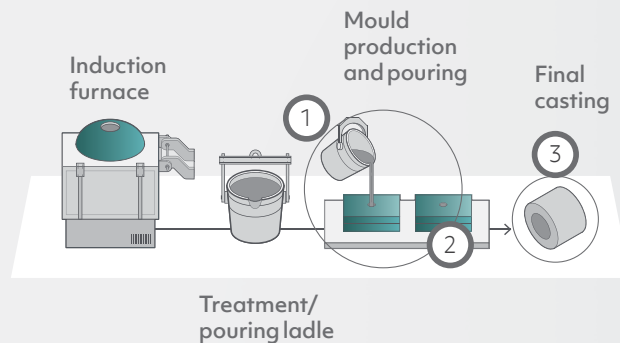
We are also focused on expanding the cross-selling opportunities between the Advanced Refractories and Foundry business units. Foundries utilise some of the refractory products manufactured by Advanced Refractories, which allows us to offer a complete product offering to our customers.

✚ See Foundry Operating review on p50-51

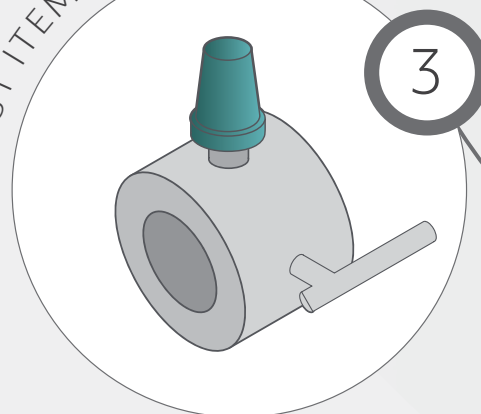
Overview

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.

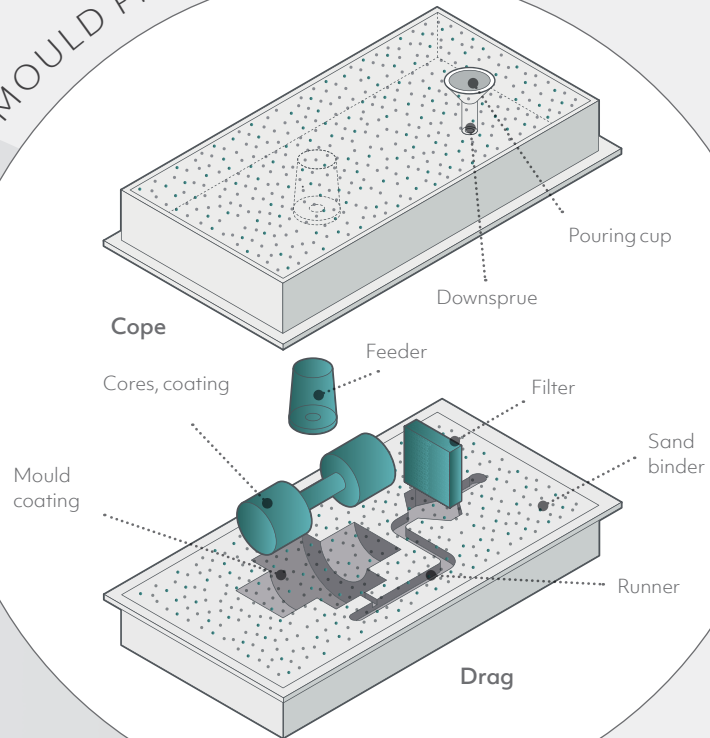
Foundry products



CAST ITEM (before fettling)

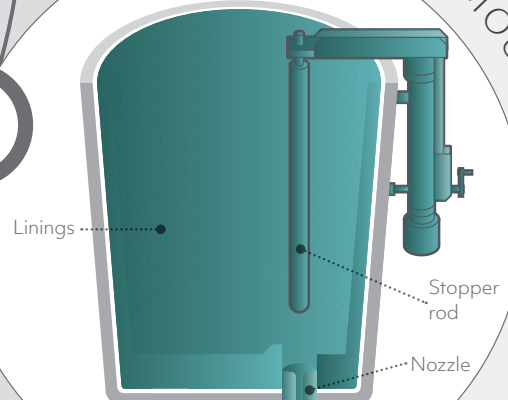


MOULD PRODUCTION

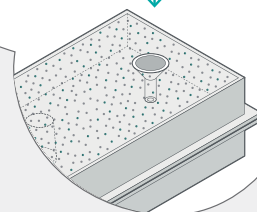


1

POURING INTO MOULD



2



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



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 CO₂ 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.

John McDonough
CBE
Chairman



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

➤ 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

We are Analysts Strategists Innovators Entrepreneurs

Our business



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). 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



➤ 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

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.

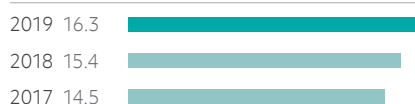
At the same time as working on our cost base, we reinforced our technology leadership position, in line with our long-term growth strategy. The key actions taken included the expansion of our Advanced Refractory research centre in Vizag (India), the launch of our new Flow Control research centre in Suzhou (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

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

Reinforce our technology leadership



Increase penetration of value-creating solutions



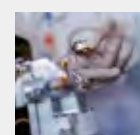
Capture growth in developing markets



Improve cost leadership and margins



Develop our technical service offering



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
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>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&D network, with the opening of our R&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&D efficiency by focusing our efforts on a reduced number of potentially high-impact projects.</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>In 2019, we accelerated our R&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"> > Flow Control – new generation of ladle slide-gate plates and systems and new high-performance tundish slide-gates > Advanced Refractories – optimised monolithic refractory formulations > 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 <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>
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>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>
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>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>
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 & 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>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 CO₂ emissions, generating significant amounts of CO₂. 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 CO₂, 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 CO₂ emissions (through the elimination of higher emission processes) and reducing normalised energy consumption and CO₂ 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 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'

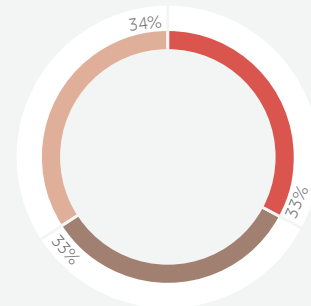
'High-technology steel' is our internal marketing segmentation that describes steel which is either high performing (e.g. high-strength steel for wind turbines) and/or where the production process to produce the steel is complex, e.g. the near net shape production process, the continuous casting process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

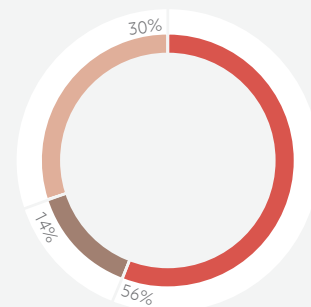
Advanced steel cans are produced from 'high-technology steel' because of the need to achieve a challenging combination of thin gauge and high rigidity/strength.



Vesuvius' internal segmentation of global crude steel production



Flow Control business unit end-markets



- | | |
|--|---|
| High-technology steel <ul style="list-style-type: none"> > Near net shape production process > Stainless steel > Engineering steel: bearing, shafts, tools, etc. > Automotive steel | Medium-technology steel <ul style="list-style-type: none"> > Construction sheets: roofing, cladding, etc. > Heavy plates for ship building, pipe |
| Commodity steel <ul style="list-style-type: none"> > 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.

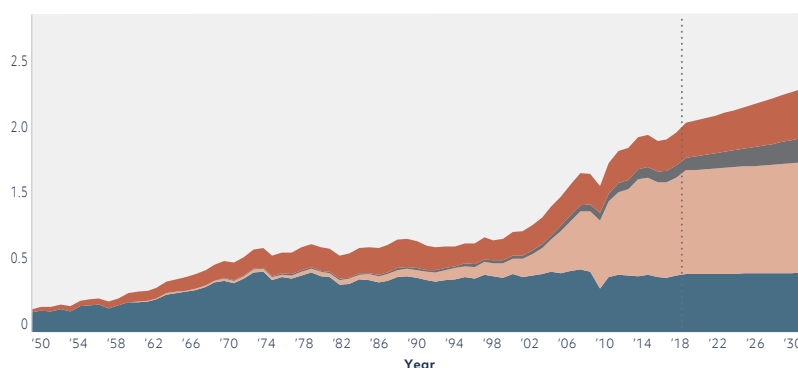
We believe that the majority of the growth in crude steel production going forward will come from India and other emerging markets, mostly the Middle East, Africa, South East Asia and Latin America.

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:

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

World crude steel production (mt)



CAGR '18-'30

+2.9%

Other emerging markets¹

+5.6%

India

+0.5%

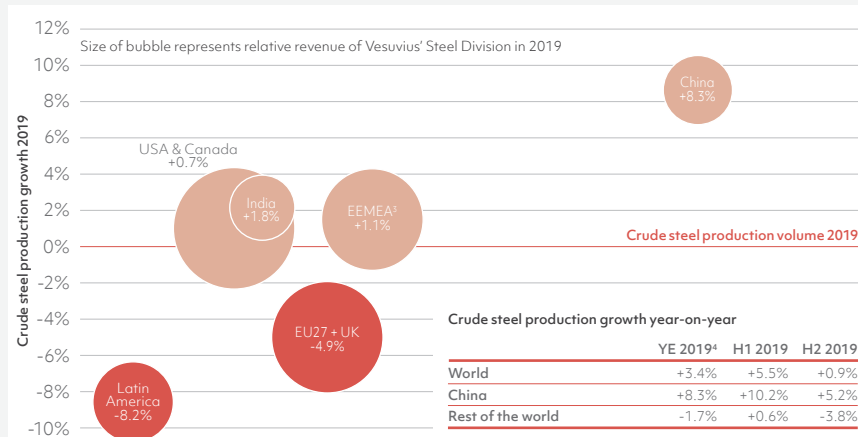
China

+0.2%

Developed markets²

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

Challenging environment in the steel markets outside China



Crude steel production growth year-on-year

	YE 2019 ⁴	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.

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.

6

R&D centres of excellence

10,496

Employees

54

Production sites

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

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.

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.

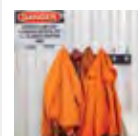


➤ Read more about our **Value-added solutions** on p14 and 15

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



JianmingXue
Canning Operator for BYline
Suzhou, China

Section 172(1) Statement continued

Our stakeholders

Why we engage	Types of engagement undertaken	Issues relevant to the stakeholder group
Our people 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.	Fundamental focus on health and safety and the care and preservation of all employees Continuing dialogue between employees and their managers, including the conduct of regular performance reviews Competitive remuneration and benefits strategy, emphasising talent development with tailored career-stage programmes. Living the Values and other award schemes celebrate individuals' achievements 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 Wide-ranging internal training is offered on key job-related issues, with programmes such as the Vesuvius University – HeatT, and the Foseco University Many businesses operate family days, when the facility is open to friends and family	Personal development Remuneration evolution International mobility Employee engagement Development and retention Career opportunities Health and safety Diversity and inclusion Environmental performance
Students and graduates 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&D capability.	The Group maintains contact with universities and R&D collaborations to identify and develop talent and complement our in-house R&D capability Our businesses attend careers fairs and provide student work placements and internships Vesuvius' website provides prospective applicants with detailed information about the Group	Career opportunities, personal development, engagement and retention Research and innovation Training and mobility
Customers 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.	Senior-level dialogue is maintained with all key customers, including Directors' visits to customers' sites Our business model focuses on collaboration with customers, to provide customised solutions, and more than 2,500 Vesuvius representatives are embedded at customer locations The Group manages customer relationships on a global basis as required, complemented by diverse local servicing capability We engage with customers on safety leadership and support their training requirements We provide customer training, including the Foseco University, and participate in industry forums and events	Customer satisfaction Product performance and efficiency Innovation and provision of solutions Health and safety Sustainability performance
Suppliers and contractors Maintaining a flexible workforce through the use of contractors and cost-effective access to high-quality raw materials is vital to our success. Our contractors and suppliers are critical to our business.	Vesuvius conducts regular visits to key suppliers Senior-level relationships are built with large suppliers All suppliers/brokers have regular interaction with the Global Purchasing Team Dedicated category directors build long-term relationships and product expertise There is a rigorous and consistent supplier accreditation procedure Effective working protocols, including work risk assessments, are established with contractors	Operational performance Responsible procurement Trust and ethics Payment practices
Investors 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. Supportive investors are more likely to provide the Company with funds for expansion.	Vesuvius' Investor Relations Strategy managed by the Group Finance Director and Chief Executive includes regular meetings with key and prospective investors 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 The AGM provides all shareholders with an opportunity to directly engage with the Board There is ongoing dialogue with the Company's analysts to address enquiries and promote the business	Financial performance Strong governance and transparency Environmental performance Diversity and inclusion Director remuneration Board performance

Why we engage	Types of engagement undertaken	Issues relevant to the stakeholder group
Lenders (Banks and debt investors) <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> <hr/> <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> <hr/> <p>Representatives from the banks are invited to the Group's results presentations</p> <hr/>	<p>Financial performance</p> <hr/> <p>Group internal control and audit processes</p> <hr/> <p>Strategic planning and ability to repay debt</p> <hr/> <p>Gearing and monitoring of financial covenant ratios</p> <hr/> <p>Business continuity planning</p> <hr/> <p>Transparency/ethical behaviour</p> <hr/>
Communities <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> <hr/> <p>Sponsoring of charitable activities</p> <hr/> <p>Participation in local volunteering initiatives</p> <hr/>	<p>Operational performance</p> <hr/> <p>Transparency/ethical behaviour</p> <hr/>
Environmental agencies and organisations <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> <hr/> <p>Annual Report and Financial Statements</p> <hr/> <p>Response to environmental research as part of customer and supplier due diligence</p> <hr/> <p>Participation in environmental and social responsibility research and questionnaires</p> <hr/>	<p>Governance and transparency</p> <hr/> <p>Operational performance</p> <hr/>
Governments and regulatory agencies <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> <hr/> <p>Participation in appropriate government and industry working groups</p> <hr/> <p>Membership of industry associations and contribution to best practice guidance</p> <hr/> <p>Lobbying and direct contact with appropriate bodies on key business issues</p> <hr/>	<p>Trust and ethics</p> <hr/> <p>Governance and transparency</p> <hr/>
Pensioners and deferred pensioners <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> <hr/> <p>Regular contact with the trustees and custodians of the Group's benefit plans, as appropriate</p> <hr/>	<p>Financial performance</p> <hr/>

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

Identify	→ Assess	→ Model	→ Report
Viability time horizon and risk analysis framework	Principal risks and stress scenarios	Viability against risk scenarios, examining probabilities and impacts	⊕ See Viability Statement

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

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

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
End-market risks <> <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>Margin reduction</p> <p>Customer failure leading to increased bad debts</p> <p>Loss of market share to competition</p> <p>Cost pressures at customers leading to use of cheaper solutions</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&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>
Protectionism and globalisation <> <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>Increased barriers to entry for new businesses or expansion</p> <p>Increased costs from import duties, taxation or tariffs</p> <p>Loss of market share</p> <p>Trade restrictions</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>
Product quality failure <> <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>Injury to staff and contractors</p> <p>Product or application failures lead to adverse financial impact or loss of reputation as technology leader</p> <p>Incident at customer plant causes manufacturing downtime or damage to infrastructure</p> <p>Customer claims from product quality issues</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>
Complex and changing regulatory environment ^ <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>Revenue reduction from reduced end-market access</p> <p>Disruption of supply chain and route to market</p> <p>Increased internal control processes</p> <p>Increased frequency of regulatory investigations</p> <p>Reputational damage</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>
Failure to secure innovation <> <p>Vesuvius fails to achieve continuous improvement in its products, systems and services</p> <p>Strategic alignment   </p>	<p>Product substitution by customers</p> <p>Increased competitive pressure through lack of differentiation of Vesuvius offering</p> <p>Commoditisation of product portfolio through lack of development</p> <p>Lack of response to changing customer needs</p> <p>Loss of intellectual property protection</p>	<p>Enduring and significant investment in R&D, with market-leading research</p> <p>A shared strategy for innovation throughout the Group, deployed via our R&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



Decreased



Stable

Risk	Potential impact	Mitigation
Business interruption  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   	Loss/closure of a major plant temporarily or permanently impairing our ability to serve our customers Damage to or restriction in ability to use assets Denial of access to critical systems or control processes Disruption of manufacturing processes Inability to source critical raw materials	Diversified manufacturing footprint Disaster recovery planning Business continuity planning with strategic maintenance of excess capacity Physical and IT control systems security, access and training Cyber risks integrated into wider risk-management structure Well-established global insurance programme Group-wide safety management programmes Dual sourcing strategy and development of substitutes
People, culture and performance  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   	Organisational culture of high performance is not achieved Staff turnover in growing economies and regions Stagnation of ideas and development opportunities Loss of expertise and critical business knowledge Reduced management pipeline for succession to senior positions	Internal focus on talent development and training, with tailored career-stage programmes and clear performance management strategies Contacts with universities to identify and develop talent Career path planning and global opportunities for high-potential staff Internal programmes for the structured transfer of technical and other knowledge Clearly elucidated Values underpin business culture
Health and safety  Vesuvius staff or contractors are injured at work because of failures in Vesuvius' operations, equipment or processes   	Injury to staff and contractors Health and safety breaches Manufacturing downtime or damage to infrastructure from incident at plant Inability to attract the necessary workforce Reputational damage	Active safety programmes, with ongoing wide-ranging monitoring and safety training Independent safety audit team Quality management programmes including stringent manufacturing process control standards, monitoring and reporting
Environmental, Social and Governance (ESG) criteria  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   	Loss of opportunity to grow sales Loss of opportunity to increase margin Loss of stakeholder confidence including investors Reputational damage	Development of appropriate ESG measures for the business Investment in R&D to develop products to assist our customers in reducing their carbon emissions and improve their own ESG measures Skilled technical sales force to develop efficient solutions for our customers The Group-wide Code of Conduct, ABC Policy with a zero tolerance regarding bribery and corruption Internal Speak Up mechanisms to allow reporting of concerns Extensive use of due diligence involving existing and potential investments, business partners and customers

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

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



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.

Financial KPIs

Strategic alignment	KPI	Purpose
Deliver growth 	Underlying revenue growth	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
Generate sustainable profitability and create shareholder value 	Trading profit and return on sales	Used to assess the trading performance of Group businesses
	Headline profit before tax	Used to assess the financial performance of the Group as a whole
	Headline earnings per share	Used to assess the underlying earnings performance of the Group as a whole
	Return on net assets	Used to assess the financial performance and asset management of the Group
Maintain strong cash generation and an efficient capital structure 	Free cash flow	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
	Average working capital to sales ratio	
	Interest cover ratio Ratio of net debt to EBITDA	Both ratios are used to assess the financial position of the Group and its ability to fund future growth

Non-financial KPIs

Strategic alignment	KPI	Performance
Provide a safe working environment for our people 	Lost time injury frequency rate	Lost time injury frequency rate* 2019 1.5  2018 1.3  2017 1.6 
Be at the forefront of innovation 	R&D spend	Total R&D spend** £m 2019 29.1  2018 34.1  2017 33.2 

Performance

Link to remuneration

Underlying revenue growth %



Trading profit £m



Return on sales %



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

Headline profit before tax £m



Headline EPS p



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 **Directors' Remuneration Report** on p114-125

Return on net assets %



Free cash flow £m



Average working capital to sales %



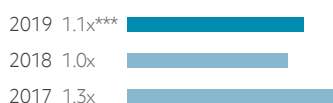
In 2019, working capital performance was linked to remuneration through the use of the Group's working capital to sales ratio as one of the measures used in the AIP

🔗 **AIP** – Read more about this on p118-119

Interest cover



Net debt to EBITDA



🔗 Read more about **Safety** on p58-63

Strategic Alignment

KPI

Performance

Run top-quality, cost-efficient and sustainable operations



Total energy consumption

🔗 Read more about **Sustainability** on p64-67

Energy Used kWh per metric tonne product packed for shipment



New product sales**** %



Non-Financial KPIs - link to remuneration

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 CO₂ emissions.

* 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%

Underlying¹
-5.7%

£181.4m

Trading profit²

Reported
-8.0%

Underlying¹
-9.0%

29.8p

Statutory EPS

Reported
-41.9%

10.6%

Return on sales²

Reported
-40bps

Underlying¹
-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 downcycles. 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:

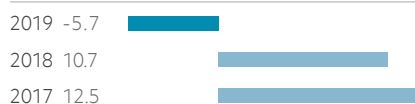
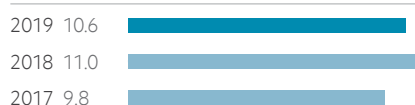
1. **Organic growth.** We have capital expenditure and restructuring programmes that we believe deliver the best possible returns to our shareholders.
2. **Inorganic growth.** We review acquisition opportunities against a strict set of assessment criteria, including: strategic fit; margin relative to Group target return on sales of 12.5%; and return on capital.
3. **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%)

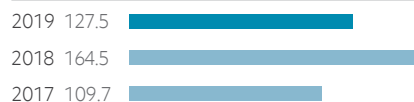
Trading profit

£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%



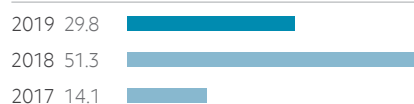
Headline earnings per share pence

45.1p -9.1%



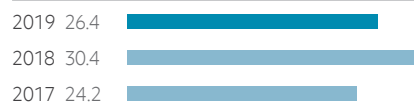
Statutory earnings per share pence

29.8p -41.9%



RONA moving average* %

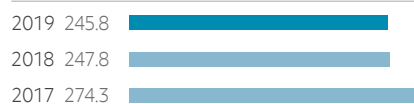
26.4%



* 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&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.

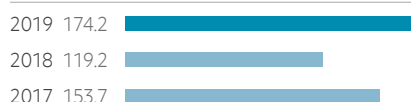
Financial risk factors

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.



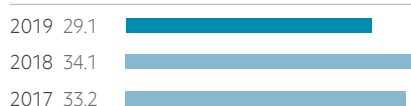
Unutilised committed debt facilities £m

£174.2m



Total R&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.

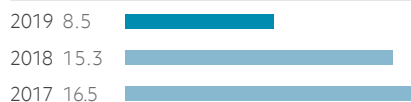
The restructuring programmes are now expected to deliver incremental recurring annual savings of £19.4m in 2020, £6.2m in 2021 and £1.9m in 2022, which is an increase of £3.0m in comparison with previously announced targets. This increase in recurring cash savings will be delivered at an additional one-off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

Our performance

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%¹ 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%¹, 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.

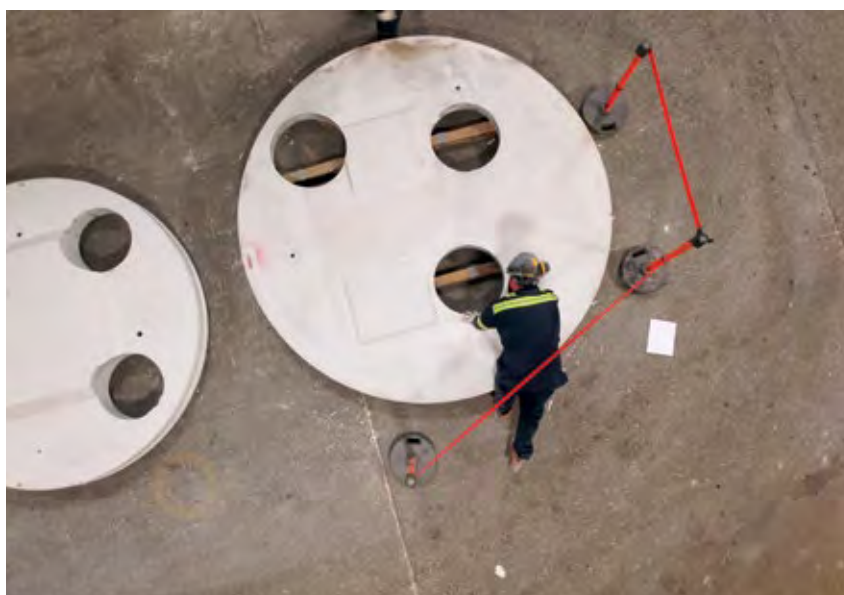
New value-added solutions

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



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 sublimance 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.

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.

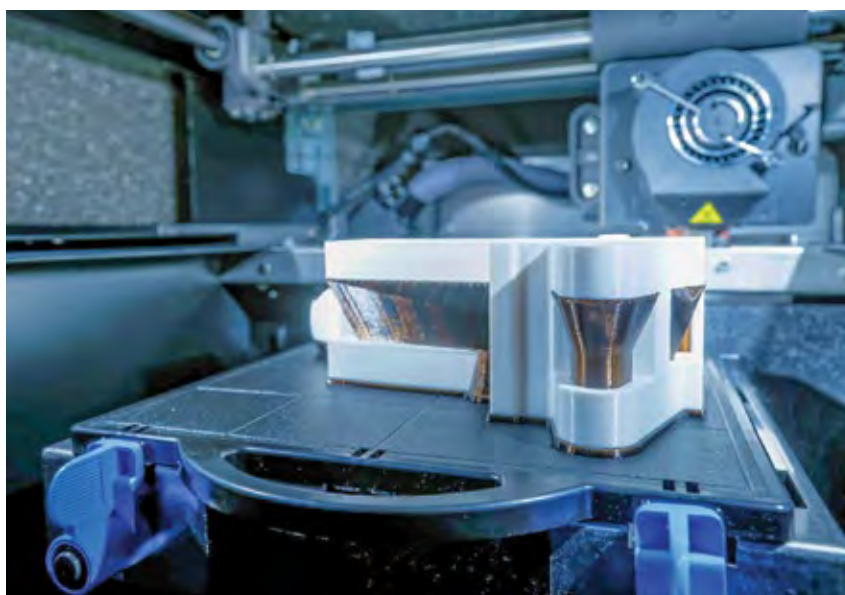
Strategic highlights from the year

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.

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.



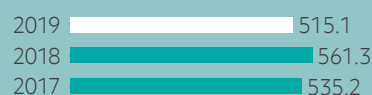
Launch of a unique feeding system technology for aluminium castings

- > 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%¹ and 11.5%¹ 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



Our performance

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



Non-financial information

- 54 Non-financial information statement
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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

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. 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.

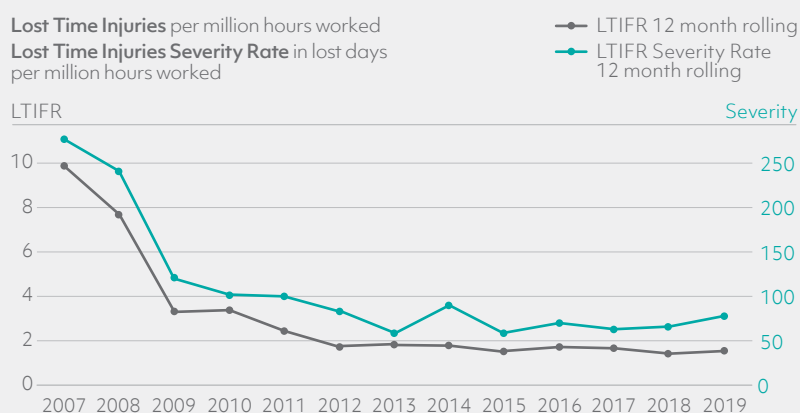
D1	clarify the problem
D2	grasp the current situation
D3	contain and set target
D4	analyse causes
D5	define countermeasures
D6	execute and track progress
D7	check results
D8	standardise and establish control



Health and safety continued

Safety performance in 2019

Lost Time Injuries per million hours worked
Lost Time Injuries Severity Rate in lost days per million hours worked



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

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 | | |

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 steel mills.

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.



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 CO₂ 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 CO₂ in the steel manufacturing process.

In the foundry process, the amount of metal melted versus the amount sold as finished castings is the critical factor impacting a foundry's environmental efficiency. Vesuvius continuously works with its customers to increase 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 CO₂e emissions. (We report in kg of CO₂ equivalent (CO₂e).) A further four processes consume 25% of the Group's total energy consumption and represent 17% of

our CO₂e 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 CO₂ and, building on the successes of previous years, continues to be a clear focus for our investment to reduce CO₂ 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 Foseco 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 CO₂ 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 CO₂e 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 CO₂ emissions rose by 0.9%, thanks to this improved energy mix and global energy consumption decrease, the absolute CO₂ 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 ₂ e m kg 2019	CO ₂ 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%
Total¹	1,154,962	1,294,533	-10.8%	423.1	480.8	-12.0%

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 m³ 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 CO₂e 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.

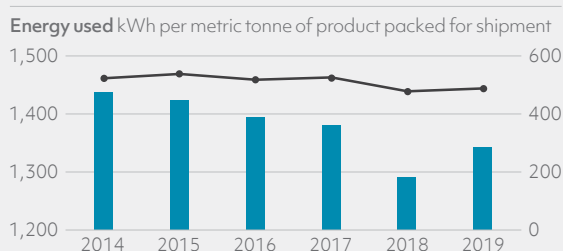
Managing our energy intensity not only has an environmental benefit but is also part of our long-term strategy to enhance our cost-competitiveness.

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.

Energy conservation



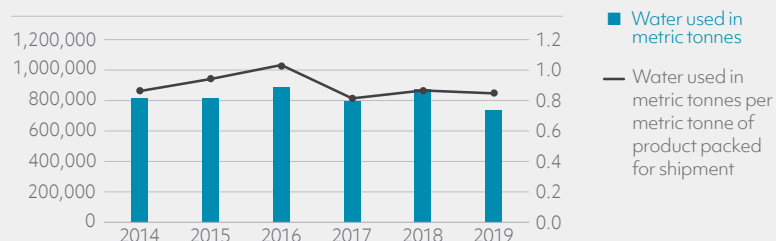
Sustainability continued

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 CO₂, with emissions of other GHGs (Methane Emissions, Direct N₂O Emissions, Direct Sulphur Hexafluoride Emissions, Direct Methane Emissions in CO₂ equivalent, Direct N₂O Emissions in CO₂ equivalent, Direct HFC Emissions in

CO₂ equivalent, Direct PFC Emissions in CO₂ Equivalent, Direct SF₆ Emissions in CO₂ 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) CO₂e. We report in kg of CO₂ equivalent (CO₂e).

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 CO₂e)

	2019	2018
Emissions source		
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%	
Vesuvius' chosen intensity measurement (kg of CO₂e per metric tonne of product packed for shipment)		
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.

iengage

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

iengage

<p>“ 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. ”</p>	<p>“ 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. ”</p>
<p>“ 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. ”</p>	<p>“ 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. ”</p>

People and community continued



**LIVING THE
VALUES**
AWARDS 2019



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
Chief Executive

Guy Young
Chief Financial Officer

We are Creators Ground breakers Discoverers Free-thinkers

If I were to sum up the culture of Vesuvius, it would be 'think beyond your limits'.

I joined the Company towards the end of 2016 after completing my PhD in nanotechnology. I wanted to continue in research and Vesuvius' strategy of a strong focus on R&D made it very appealing to me as a company to work for.

I arrived as a scientist and during my three years at the Foundry R&D Centre in Enschede, Vesuvius has provided me with a number of challenging opportunities and the support I needed to fulfil them. Valuable managerial training has enabled me to progress my professional development, honing the skills necessary to be an effective and positive team leader.

Innovation is one of the key pillars of the success of Vesuvius. Within the R&D team of the Foundry Division, we go deep into the fundamental understanding of the feeding systems, identifying problems, key areas of research and new ways to improve performance in our own processes and, by extension, for our customers. I am actively involved in internal and external networking with our other sites, universities and research centres. This is a rich resource for pinpointing the best projects to maintain our status as a global leader in feeding systems technology.

Laura Graña Suarez

R&D Manager, Feeding Systems Group,
Foundry R&D Centre Enschede, the Netherlands



Find out more at
report2019.vesuvius.com



Governance

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Board of Directors

John McDonough CBE

Chairman

Appointed to the Board
31 October 2012



Key strengths

- > Proven strategic and leadership skills gained in a complex multinational business
- > Strong engineering background and global commercial experience
- > Clear leadership understanding of safety issues
- > Operational and strategic understanding of a range of business environments gained from working in Asia-Pacific, EMEA and the UK
- > Experience as CEO with an international listed company

Current external appointments

He is Chairman of Sunbird Business Services Limited and a Non-executive Director of Cornerstone Property Assets Limited.

Career experience

John spent 11 years as Group Chief Executive Officer of Carillion plc until he retired in 2011. Prior to this, he spent nine years working for Johnson Controls. He served as Chairman of The Vitec Group plc until retiring from the board at its AGM in May 2019. He has also previously served as a Non-executive Director and Chairman of the Remuneration Committee of Tomkins plc, as a non-executive Director of Exel plc and as a Trustee of Team Rubicon UK.

John was awarded a CBE in 2011 for services to industry.

Douglas Hurt

Senior Independent Director

Appointed to the Board
2 April 2015



Key strengths

- > Qualified Chartered Accountant, with significant recent and relevant financial experience having served as Finance Director of a listed UK company for nine years
- > Highly knowledgeable of both corporate and operational financial matters, with significant US and European experience
- > Proven general management and leadership skills

Current external appointments

Senior Independent Director and Chairman of the Audit Committee of Countryside Properties PLC, and a Non-executive Director and Chairman of the Audit Committee of the British Standards Institution.

Career experience

Douglas was Finance Director of IMI plc, the global engineering group, for nine years until 2015. Prior to this, he spent 23 years at GlaxoSmithKline plc where he held a number of senior finance and general management positions. Douglas served as Senior Independent Director and Chairman of the Audit Committee of Tate & Lyle plc until July 2019. He began his career at Price Waterhouse.

Douglas is a Chartered Accountant.

Hock Goh

Non-executive Independent Director

Appointed to the Board
2 April 2015



Key strengths

- > Strong focus on R&D and technology
- > Wealth of experience dealing with safety and sustainability matters gained from more than 35 years working in the oil and gas industry
- > In-depth knowledge of Asian markets
- > Strong international commercial experience, gained through a global career in the oil and gas industry

Current external appointments

Non-executive Director of AB SKF, Santos Ltd and Stora Enso Oyj.

Career experience

Hock spent 25 years with Schlumberger, where his roles included serving as President of Network and Infrastructure Solutions in London, President of Asia-Pacific, and Vice President and General Manager of China. Following this, Hock spent seven years as a Partner of Baird Capital Partners Asia, based in China. He has previously served as Chairman of Advent Energy Ltd and MEC Resources Ltd, and as a Non-executive Director of Harbour Energy Ltd.

Friederike Helfer

Non-executive Director

Appointed to the Board
4 December 2019



Key strengths

- > An experienced strategist, with strong analytic capability
- > Commercial acumen and a strong track record of working with a portfolio of companies to identify scope for operational and strategic improvement

Current external appointments

Partner of Cevian Capital*, and was appointed a Non-executive director of the Supervisory Board of thyssenkrupp AG on 31 January 2020.

* Cevian Capital is a shareholder of Vesuvius plc and, at 27 February 2020, held 21.11% of Vesuvius' issued share capital.

Career experience

Friederike is a Partner of Cevian Capital.

Friederike joined Cevian in 2008 and from 2013 to 2017, served on the Board of Directors and the Audit Committee of Valmet, a Finnish engineering company, in which Cevian was also invested. Prior to joining Cevian, Friederike Helfer worked at McKinsey & Company. She is a CFA charter holder.

Key to Board Committee membership

- A Audit Committee R Remuneration Committee
N Nomination Committee ● Committee Chairman

Changes to the Board during the year

The Directors named below were in office during the year and up to the date of this Annual Report with the exception of Friederike Helfer who was appointed to the Board on 4 December 2019. Christer Gardell retired from the Board on 4 December 2019.

Patrick André

Chief Executive

Appointed to the Board
1 September 2017



Key strengths

- > Global career serving the steel industry
- > Strong background in strategic development and implementation
- > Consumer focus and proven record of delivery, with strong commercial acumen
- > Drive and energy in promoting his strategic vision

Current external appointments

None

Career experience

Patrick was President of the Vesuvius Flow Control business unit prior to his appointment as Chief Executive of the Group. Before joining the Group in 2016, he served as Executive Vice President Strategic Growth, CEO Europe and CEO for Asia, CIS and Africa for Lhoist company, the world leader in lime production. Prior to this, he was CEO of the Nickel division, then CEO of the Manganese division of ERAMET group, a global manufacturer of nickel and special alloys.

Guy Young

Chief Financial Officer

Appointed to the Board
1 November 2015



Key strengths

- > Extensive international experience gained in the mining and industrial sectors
- > Qualified Chartered Accountant, with significant financial and business development experience
- > Drive and energy in managing people and teams
- > Focus on strategic execution and business optimisation

Current external appointments

None

Career experience

Guy was Chief Financial Officer of Tarmac and latterly Lafarge Tarmac, the British building materials company, between 2011 and 2015. Prior to this he spent 13 years working at Anglo American plc in various senior financial and business development positions, including as Chief Financial Officer of Scaw Metals Group, the South African steel products manufacturer.

Guy is qualified with the South African Institute of Chartered Accountants.

Jane Hinkley

Non-executive Independent Director

Appointed to the Board
3 December 2012



Key strengths

- > Proven track record of managing complex global trading business
- > Qualified Chartered Accountant, with significant financial and operational experience in large multinational companies
- > Well-developed leadership and global team management skills

Current external appointments

None

Career experience

Jane was Managing Director of Navion Shipping AS for three years until 2001. Prior to this, she spent a large part of her executive career working at Gotaas-Larsen Shipping Corporation, the liquefied natural gas shipping specialist, where she served as Chief Financial Officer and Managing Director. She served as Chairman of Teekay GP LLC until May 2019, as a Non-executive Director and Chairman of the Remuneration Committee of Premier Oil plc until December 2019, and was also previously a Non-executive Director of Revus Energy ASA.

Jane is a Chartered Accountant.

Holly Koepfel

Non-executive Independent Director

Appointed to the Board
3 April 2017



Key strengths

- > A strong track record of growing businesses, with more than 35 years of domestic and international utility, power and infrastructure experience
- > International financial and operational experience managing assets on five continents
- > Strong board experience both as an independent non-executive director and as an investor, in the US and internationally

Current external appointments

Non-executive Director and Chairman of the Audit Committee of British American Tobacco p.l.c., Non-executive Director and Chairman of the Governance Committee of The AES Corporation and a Non-executive Director of Arch Coal, Inc.

Career experience

From 2000 to 2009, Holly worked at American Electric Power Company, Inc., latterly serving as Chief Financial Officer. Prior to this, she spent 15 years at the Consolidated Natural Gas Corporation in a variety of management roles which included four years based in Australia. From 2010 to 2017, Holly was Co-Head of Citi Infrastructure Investors (which was renamed Gateway). She has also served as a Director of Integrys Energy Group, Inc., and Reynolds American Inc.

Group Executive Committee

Guy Young

Chief Financial Officer
4 years with the Group



For biographical details please see the Board of Directors on page 77.

Henry Knowles

General Counsel &
Company Secretary
6 years with the Group



Appointed as General Counsel & Company Secretary in September 2013. Prior to joining Vesuvius, Henry spent eight years at Hikma Pharmaceuticals PLC, a generic pharmaceutical manufacturer with significant operations in the Middle East, North Africa and the United States where he held the roles of General Counsel and Company Secretary. Henry took responsibility for the Intellectual Property function in 2019.

Henry is based in London, UK.

Agnieszka Tomczak

Chief HR Officer
1 year with the Group



Appointed as Chief HR Officer in October 2018. Agnieszka has over 25 years of senior leadership experience in multinational companies spanning various business sectors and industries. Prior to joining Vesuvius, she spent 12 years at ICI, which was subsequently acquired by Akzo Nobel, in regional and global HR roles.

Agnieszka is based in London, UK.

Patrick André

Chief Executive
4 years with the Group



For biographical details, please see the Board of Directors on page 77.



Karena Cancilleri

President, Foundry
5 months with the Group



Appointed President, Foundry in October 2019. Karena joined the Group from Beaulieu International Group, where she served for six years as VP Engineered Products and latterly President Engineered Products. She has a broad breadth of managerial experience spanning various international leadership roles in companies such as FiberVisions, Kraton Corporation and Shell.

Karena is based in London, UK.

Thiago Avelar

President,
Advanced Refractories
1 year with the Group



Appointed President, Advanced Refractories on 1 January 2020. Thiago joined Vesuvius in February 2019 as Regional VP Steel, South America, where he was responsible for Vesuvius' Steel Operations in South America. Prior to joining the Group, he worked for RHI Magnesita and Arcelor Mittal in various technical and marketing roles based in Europe and Brazil.

Thiago is based in London, UK.

Tanmay Ganguly

President,
Business Development
14 years with the Group



Currently President, Business Development and has been appointed President, Flow Control with effect from 1 April 2020. Prior to this, Tanmay served as President, Advanced Refractories for five years. He joined the Group in India as Managing Director of Vesuvius India Ltd, before serving as Vice President Steel Flow Control and Advanced Refractories, South Asia.

Tanmay is based in Barlborough, UK.

Patrick Bikard

President, Operations &
Technology
11 years with the Group



Appointed President, Operations in January 2014 with an emphasis on improving safety and quality, and reducing inventories, creating value through customer focus, lean techniques and continuous improvement. He was also given responsibility for Technology in 2019. He was previously Vice President for Manufacturing, QHSE, Engineering and Purchasing and, prior to joining Vesuvius, he held senior operational roles at Renault, Alstom and Faurecia.

Patrick is based in Ghlin, Belgium.



Corporate Governance Statement

Chairman's governance letter

Dear Shareholder,

On behalf of the Board, I am delighted to present the 2019 Corporate Governance Statement. This year, for the first time, we are reporting compliance against the new 2018 UK Corporate Governance Code issued by the Financial Reporting Council (the 'Code').

A copy of the Code can be found on the FRC website at: <https://www.frc.org.uk/directors/corporate-governance-and-stewardship/uk-corporate-governance-code>. The new Code is a shorter and more focused document than its predecessor, with a greater emphasis on purpose, culture and stakeholder engagement.

The Board of Vesuvius plc (the 'Company') is committed to maintaining high standards of governance and to developing them to reflect progression in best practice. The Corporate Governance Statement (the 'CG Statement') provides investors and other stakeholders with an annual insight into the governance activities of the Board and its Committees. The CG Statement also describes how the Group has complied with the Code Principles during 2019, except where we considered it more natural for us to describe the application of a Principle elsewhere in this Annual Report. The table opposite signposts where detailed information on each section of the Code (and associated Principles) can be found.

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.

As a Board, we remain committed to applying the highest standards of corporate governance, recognising that robust governance and culture underpin business success. With the advent of the new Code, we took the opportunity to refine some of our governance procedures, with a particular focus on how we assess the Group's culture and how we embed the practices which best promote the long-term success of the Group. Further details of our activities in this regard are given in the remainder of the CG Statement on pages 81-125.

We have spent more time this year formally considering the Group's engagement with its wide range of stakeholders, and for the first time conducted an extensive employee engagement survey. We were delighted that over 90% of our employees took the time to contribute their opinions on life at Vesuvius. The results have been analysed and shared in two-way meetings at all levels throughout the Group. Action plans have been created to address the issues raised and to ensure that we optimise this engagement with our workforce throughout the world. This is the beginning of a new dialogue with our employees and we intend to build on this foundation by issuing another survey, followed by another round of reviews, later this year.

The Nomination Committee has once again been focusing on succession planning, with more detailed activity on strengthening the Group's talent pool for senior management and discussing the future plans and priorities for Board rotation. It also oversaw the appointment of Friederike Helfer from Cevian Capital, who joined us when Christer Gardell stepped down from the Board in December 2019.

The Remuneration Committee's work this year has centred on the development of the new triennial Remuneration Policy, on which we have sought our major shareholders' views. The Audit Committee has been considering the Group's response to cyber security alongside its more standard responsibilities. Further details on the work of each of the Committees can be found in the respective Committees' Reports on pages 89-125.

The Board's formal evaluation process for 2019 was externally facilitated by the corporate advisory firm, Lintstock. The results of the review highlighted the Board's composition and dynamics as particular strengths, and concluded that the Board remained strong and effective with a good level of constructive challenge and debate. The evaluation highlighted a small number of Board priorities, which we look forward to progressing in 2020.

Yours sincerely

John McDonough CBE
Chairman

27 February 2020

In this section:

- **Board leadership and company purpose** on p82
- **Division of responsibilities** on p84
- **Audit Committee report** on p89
- **Nomination Committee report** on p97
- **Directors' Remuneration Report** on p102

Also see:

- **Group's statement of purpose** on p1
- **Strategic Report** on p1-73

Board Report

2018 UK Corporate Governance Code – Information Availability

Board Leadership and Company Purpose	<p>The Corporate Governance statement ('CG Statement') on pages 80-125 gives information on the Group's compliance with Principles relating to the Board's Leadership and Company Purpose, but more detailed information on:</p> <ul style="list-style-type: none"> > the Group's statement of purpose can be found on page 1 > the Group's strategy, resources and the indicators it uses to measure performance can be found on pages 4-51 in the Strategic Report (the 'SR') > the Group's engagement with stakeholders and the Group's S172(1) Statement is contained in the Section 172(1) Statement and Stakeholder Engagement section of the SR on pages 22-27 > the Group's approach to workforce matters can be found in the People and community section of the SR on pages 68-71, with further details of the Group's approach to employee involvement and engagement contained in the Section 172(1) Statement on pages 22-27 <p>Details of the Group's framework of controls is contained in the Audit Committee report on pages 89-96 of the CG Statement and in the Risk, viability and going concern section of the SR on pages 28-33.</p>
Division of Responsibilities	<p>The CG Statement describes the structure and operation of the Board. The Nomination Committee report, on pages 97-101, describes the process the Company conducts to evaluate the Board, to ensure that it continues to operate effectively, that individual Directors' contributions are appropriate and that the oversight of the Chairman promotes a culture of openness and constructive yet challenging debate.</p>
Composition, Succession and Evaluation	<p>Details of the skills, experience and knowledge of the existing Board members can be found in the Board biographies contained on pages 76 and 77. Information on the Board's appointment process and approach to succession planning and Board evaluation is contained in the Nomination Committee report on pages 97-101 of the CG Statement.</p>
Audit, Risk and Internal Control	<p>Information on the policies and procedures the Group has in place to monitor the effectiveness of the Group's Internal and External Audit functions, and the integrity of the Group's financial statements is contained in the Audit Committee report on pages 89-96 of the CG Statement, along with an overview of the procedures in place to manage risk and oversee the internal control framework. Further information on the Group's approach to risk management is contained in the Risk, viability and going concern section of the SR on pages 28-33. The Board believes the 2019 Annual Report to be a fair, balanced and understandable assessment of the Company's position and prospects. A description of the Audit Committee's work in enabling the Board to reach this conclusion is contained in the Audit Committee report on pages 89-96.</p>
Remuneration	<p>The Directors' Remuneration Report section of the CG Statement describes the Group's approach to Directors' remuneration, including the procedure for developing policy and the Remuneration Committee's discretion for authorising remuneration outcomes. Details of linkage of the Directors' Remuneration Policy with long-term strategy is contained on page 102 and also highlighted on page 37 in the section of Key Performance Indicators in the SR.</p>

Board Report continued

Board leadership and company purpose

The Board is responsible for leading the Group in an efficient and entrepreneurial manner, for establishing the Group's purpose, values and strategy and satisfying itself that these and the Group's culture are aligned. It focuses primarily upon strategic and policy issues and is responsible for ensuring the long-term sustainable success of the Group. It sets the Group's strategy, oversees the allocation of resources and monitors the performance of the Group. It is responsible for effective risk assessment and management. In performance of these duties, the Board has regard to the interests of the Group's key stakeholders and is cognisant of the potential impact of the decisions it makes on wider society.

Purpose

Vesuvius' stated purpose is to be a global leader in molten metal flow engineering and technology. In order to achieve this, the Group develops innovative solutions that enable our customers to improve their sustainability footprint, manufacturing quality and safety performance, whilst reducing cost by driving efficiency in their processes. The Group aims to deliver sustainable, profitable growth to provide its shareholders with a superior return on their investment, whilst providing each of its employees with a safe workplace where they are recognised, developed and properly rewarded.

The Board has identified seven key strategic objectives which form the basis for achieving this long-term sustainable success. It is currently pursuing five shorter-term key execution priorities, which define the Group's immediate strategic aims. Further information on these can be found on pages 14 and 15. Each month the Board reviews the Group's performance against a number of Key Performance Indicators (KPIs) which provide information on key aspects of the Group's financial and non-financial performance. This information assists the Board to assess progress with the execution of the Group's strategy and to determine any remedial action that needs to be taken. Detailed information on the Group's KPIs can be found on pages 36 and 37.

The Group has established a framework of prudent and effective controls to enable risk to be assessed and managed, further information on which can be found in the Audit, risk and internal control section on page 88 of this Board Report.

Culture

The Board takes seriously its responsibility for shaping and monitoring the corporate culture of the Group. In 2018, a new set of CORE Values was launched across the Group – Courage, Ownership, Respect and Energy. These Values define our priorities for behaviour across the business and are the practical representation of the culture we seek to foster, aligning with the Company's purpose, values and strategy, and supporting our governance and control processes. These values were rolled out across the Group and are prominently displayed at all sites. Our CORE Values are reinforced in our performance management systems, which ensure that they are firmly embedded in our day-to-day conversations and behaviours. Further detail can be found on page 55.

The CORE Values are supported by the Group's Code of Conduct which sets out the standards of conduct expected, without exception, of everyone who works for Vesuvius in any of its worldwide operations. The Code of Conduct emphasises the Group's commitment to ethics and compliance with the law, and covers every aspect of Vesuvius' approach to business, from the way that the Group engages with customers, employees, its markets and each of its other stakeholders, to the safety of its employees and places of work. Everyone within Vesuvius is individually accountable for upholding these requirements.

Vesuvius recognises that lasting business success is measured not only in financial performance but in the way in which the Group deals with its customers, business associates, employees, investors and local communities. The Board seeks to ensure that the Group's workforce policies and practices are consistent with the Group's long-term sustainable success. Further information about the Group's remuneration practices for senior managers can be found in the Directors' Remuneration Report on pages 102-125, the Group's approach to diversity in the Nomination Committee report on page 99, the Group's approach to HR matters in the People and community section on pages 68-73 and the Group's policies and procedures, including information on the Speak Up confidential employee concern helpline in the Our principles section on pages 54-57.

The Board recognises the need to 'walk the talk' on our CORE Values and all the Directors act with integrity and are fully committed to leading by example to promote the desired culture.

During the year, the Board's assessment of the Group's culture focused on the Group's:

(1) **Adherence to the CORE Values** – Throughout the year, the Board focused on ensuring that there is a consistent culture across the Group, underpinned by the CORE Values. It was delighted that 1,254 employees (12%) of the organisation were nominated for Living the Values Awards, which showcase examples of individuals and teams going the 'extra mile' to live the CORE Values. During site visits, the Directors focused on the extent to which the values are published, understood and motivate employee behaviour, and reported on their individual findings to the Board.

(2) **Commitment to safety** – The Board received monthly updates on the Group's performance against safety targets, and a thorough analysis of all Lost Time Incidents. All incidents are reported in detail at the next Board meeting. In addition, the Board receives biannual reports on the progress of the Group's safety programmes. In 2019, the Board supported the introduction of a new, dedicated process for safety auditing and the launch of a new set of Core Safety Rules. The Directors also used individual site visits to assess each site's commitment to safety, and the Remuneration Committee set the Executive Directors specific safety targets as part of their personal objectives for the Annual Incentive Plan.

(3) **Entrepreneurship** – As part of the Board's rolling agenda, the Board received reports from each of the business unit Presidents on their business's strategy, new commercial initiatives and future technology trends. These were complemented by a presentation from the President Operations & Technology on R&D activities throughout the Group. The Board also received quarterly reports on the Group's progress on innovation as well as other strategic initiatives. Following the strategy presentations held in June 2019, the Board followed up on the structure and experience of the commercial teams across the Group at subsequent meetings.

(4) **Transparency** – The Board used individual and collective site visits to assess the level of engagement and openness exhibited by the employees. These first-hand reviews were supported by its review of the output of the Group's Speak Up processes, which were updated and recommunicated during the year. The Audit Committee sought qualitative feedback from External and Internal Audit on how transparent/engaged managers had been during audit interactions.

(5) **Customer focus** – The Board received monthly updates on quality performance, which were supported by a full annual presentation on the Group's ongoing initiatives on quality and a review at each Board meeting of specific quality issues. At each Board meeting, the Board also considered the state of the Group's markets and the associated customer developments. As with previous years, the Chief Executive undertook regular visits to customers in 2019 and the Board incorporated customer visits into their Vesuvius site visit programme.

(6) **Diversity and respect for local cultures** – The Board reviewed the results of the employee engagement survey and subsequent management actions. The Board approved a new Group Diversity Policy.

Formal Board activities were supplemented by informal opportunities for the Non-executive Directors to interact directly with Vesuvius colleagues through Board dinners and site visits, and enabled Directors to undertake a rounded assessment of the Group's culture and direction. In 2019, visits were conducted by all the Non-executive Directors, covering sites in Belgium, Brazil, the Czech Republic, Germany, India, Japan, Mexico, Poland, South Korea and the USA. These visits provided the Board with greater clarity on local organisation and management, and the views of employees, as well as providing updates on business performance. The Directors engaged in first-hand discussions on culture and purpose, providing direct feedback on safety culture, understanding of Vesuvius' CORE Values, the work being conducted on diversity and programmes to develop and enhance employees' engagement – all of which remain key themes for the Board's attention in 2020 and beyond.

The Board identified areas for particular focus going forward, including rolling out the new Diversity Policy and assessing progress with its objectives, in addition to building on the enhanced employee engagement activities commenced in 2019, to strengthen the link between the Board and the Group's workforce.

Section 172 duties

The Directors are cognisant of the duty they have under Section 172 of the Companies Act 2006, 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. In performance of its duties throughout the year, the Board has had regard to the interests of the Group's key stakeholders and remained cognisant of the potential impact on these stakeholders of the decisions it has made. Details of the Board and the Company's engagement with stakeholders during the year can be found in the Section 172(1) Statement and Our Stakeholders section on pages 22-27.

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 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 the Chief Financial Officer. In advance of the 2019 AGM, we wrote 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 them should they so wish. Engagement on remuneration matters took place with a number of the Group's larger shareholders. Despite this engagement, at the 2019 AGM, 23% of votes were cast against the resolution relating to the approval of the Directors' Remuneration Report. Whilst a clear majority of shareholders were supportive of the resolution, three of the Company's larger shareholders, representing 22.67% of the Company's issued share capital, voted against the resolution. The Remuneration Committee invited a dialogue with these shareholders and spoke with two of them. The Remuneration Committee ascertained that these two investors' concerns principally related to the level of salary increase awarded to the Chief Executive for 2019 and discussed these concerns. The Company's rationale for its approach to this matter was set out in detail in the Directors' Remuneration Report in the 2018 Annual Report and Financial Statements and was discussed further in the aforementioned shareholder meetings.

The Remuneration Committee considered the earlier feedback in formulating proposals for the 2020 Remuneration Policy and wrote to shareholders at the beginning of this year inviting engagement on the proposed new Policy. We have subsequently entered into dialogue with a number of the Group's larger shareholders to discuss the new Policy.

Board Report continued**Division of responsibilities**

The Board currently comprises eight Directors – the Non-executive Chairman, John McDonough CBE; the Chief Executive, Patrick André; the Chief Financial Officer, Guy Young; and five Non-executive Directors, Hock Goh, Friederike Helfer, Jane Hinkley, Douglas Hurt and Holly Koeppel. Christer Gardell served on the Board until he was replaced by Friederike Helfer on 4 December 2019. Douglas Hurt is the Senior Independent Director. Henry Knowles is the Company Secretary.

The Board considers that, for the purposes of the UK Corporate Governance Code, four Non-executive Directors (excluding the Non-executive Chairman), namely Hock Goh, Jane Hinkley, Douglas Hurt and Holly Koeppel, are independent of management and free from any business or other relationship which could affect the exercise of their independent judgement.

Christer Gardell is Managing Partner, and Friederike Helfer is a Partner, of Cevian Capital, which continues to hold 21.11% of Vesuvius' issued ordinary share capital. As a result, Christer Gardell was not considered to be independent during his term on the Vesuvius Board and Friederike Helfer is also not considered to be independent. The Chairman satisfied the independence criteria on his appointment to the Board. The Board and its Committees have a wide range of skills, experience and knowledge, and further details of each Director's individual contribution in this regard can be found in their biographical details on pages 76 and 77.

The Chairman and Chief Executive

The division of responsibilities between the Chairman and the Chief Executive is set out in writing. These were reviewed during the year as part of the Company's annual corporate governance review. They are available to view on the Company's website www.vesuvius.com.

The Board

Responsible for Group strategy, risk management, succession and policy issues. Sets the purpose, values and culture for the Group. Monitors the Group's progress against the targets set

Chairman

Provides leadership and guidance for the Board, promoting a high standard of corporate governance. Sets the Board agenda, and chairs and manages meetings. Independent on appointment, he is the link between the Executive and Non-executive Directors

Chief Executive

Develops strategy for review and approval by the Board. Directs, monitors and manages the operational performance of the Company. Responsible for the application of Group policies, implementation of Group strategy and the resources for their delivery. Accountable to the Board for Group performance

Senior Independent Director

Acts as a sounding board for the Chairman, an alternative contact for shareholders and an intermediary for other Non-executive Directors. Leads the annual evaluation of the Chairman and recruitment process for the Chairman's replacement, when required

Non-executive Directors

Exercise a strong, independent voice, constructively challenging and supporting the Executive Directors. Scrutinise performance against objectives and monitor financial reporting. Monitor and oversee risks and controls, determine Executive Director remuneration and manage Board succession through their Committee responsibilities

The Non-executive Directors meet at least twice a year without the Executive Directors being present

Company Secretary

Advises the Chairman on governance, together with updates on regulatory and compliance matters. Supports the Board agenda with clear information flow. Acts as a link between the Board and its Committees and between Non-executive Directors and senior management

The Board

The Board has a formal schedule of matters reserved to it and delegates certain matters to its Committees. It is anticipated that the Board will convene on seven occasions during 2020, holding ad hoc meetings to consider non-scheduled business if required.

Board Committees

The principal governance Committees of the Board are the Audit, Remuneration and Nomination Committees. Each Committee has written terms of reference which were reviewed during the year. No changes were made given the amendments made in 2018 to reflect the changing governance requirements of the new Code. These are available to view on the Company's website www.vesuvius.com.

Committee composition is set out in the relevant Committee reports. No one, other than the Committee Chairman and members of the Committee, is entitled to participate in meetings of the Audit, Nomination and Remuneration Committees. However, as detailed in the Committee reports, where the agenda permits, other Directors and senior management regularly attend by invitation, supporting the operation of each of the Committees in an open and consensual manner.

The interactions in the governance process are shown in the schematic below.

Board	
Governance Committees	Administrative Committees
<p>Audit Committee To monitor the integrity of financial reporting and to assist the Board in its review of the effectiveness of the Group's internal controls and risk management systems</p> <p>Chairman Douglas Hurt</p> <p>Membership All independent Non-executive Directors</p>	<p>In addition, the Board delegates certain responsibilities to a Finance Committee and Share Scheme Committee, which operate in accordance with the delegated authority agreed by the Board</p>
<p>Remuneration Committee To determine the remuneration policy for the Executive Directors and set the appropriate remuneration for the Chairman, Executive Directors and senior management</p> <p>Chairman Jane Hinkley</p> <p>Membership All independent Non-executive Directors</p>	<p>Finance Committee To approve specific funding and Treasury-related matters in accordance with the Group's delegated authorities or as delegated by the Board</p> <p>Chairman John McDonough, Chairman</p> <p>Membership Chairman, Chief Executive, Chief Financial Officer and Group Head of Corporate Finance</p>
<p>Nomination Committee To advise the Board on appointments, retirements and resignations from the Board and its Committees and to review succession planning and talent development for the Board and senior management</p> <p>Chairman John McDonough, Chairman (except when considering his own succession, in which case the Committee is chaired by an appropriate Non-executive Director)</p> <p>Membership Chairman and any three Non-executive Directors</p>	<p>Share Scheme Committee To facilitate the administration of the Company's share schemes</p> <p>Chairman Any Board member</p> <p>Membership Any two Directors or any two Directors and the Company Secretary</p>

Group Executive Committee

The Group also operates a Group Executive Committee (GEC), which is convened and chaired by the Chief Executive and assists him in discharging his responsibilities. The GEC comprises the Chief Executive, Chief Financial Officer, the business unit Presidents, the President Business Development, the Chief HR Officer, the President Operations & Technology and the General Counsel/Company Secretary. The GEC met eight times during 2019 and is scheduled to meet eight times during 2020. Its meetings are held at different Company venues round the world, focusing on the Group's key operations.

2019 Board programme

The Board discharges its responsibilities through an annual programme of meetings.

At each scheduled meeting, the following standard items are considered:

- > Directors' duties and conflicts of interest
- > Minutes of the previous meeting and matters arising
- > Reports from the Chief Executive, the Chief Financial Officer and the Company Secretary on key aspects of the business
- > Key Performance Indicators

Board Report continued

In addition, in 2019 the Board focused on key areas of strategy, performance and governance, including the issues outlined below:

Strategy	<ul style="list-style-type: none"> > Receiving and reviewing reports on strategy from the Flow Control, Advanced Refractories, Digital Services (Sensors & Probes) and Foundry business units > Receiving and reviewing regular reports from the Chief Executive on implementation of the Group's strategic objectives, including M&A opportunities > Reviewing and approving the acquisition of CCPI > Receiving and considering reports on the Group's quality, health, safety, environmental and sustainability strategy and objectives > Participation in a two-day off-site review of strategy attended by each business unit President and the Company's key financial advisers > Receiving and considering reports on the Group's HR, purchasing, Shared Service Centre, IT, tax and treasury strategies, legal and compliance activities and the management of the Group's key pension liabilities > Receiving and considering a report on the Group's research and development strategy and objectives > Reviewing the Group's financing structure > Reviewing the Group's internal control and risk management practices > Formulating an enhancement to the Group's employee engagement strategy, implementing and then reviewing progress
Performance	<ul style="list-style-type: none"> > Receiving monthly reports on the Group's financial performance against key indicators, including each of the Group's KPIs > Receiving monthly safety reports setting out performance against key indicators > Receiving regular monthly updates from the Chief Executive on the performance of the Group's businesses with a critical focus on safety and quality > Scrutinising the Group's financial performance and forecasts > Reviewing and agreeing the annual budget and forward-looking financial planning > Approving trading updates, and preliminary and half-year results
Governance	<ul style="list-style-type: none"> > Receiving regular reports from the Board Committees > Approving the Annual Report and Notice of AGM > Approving the payment of the interim dividend, and approving the recommendation of the payment of the final dividend subject to shareholder approval > Reviewing the Group's risk appetite and monitoring the Group's key risks > Completing an evaluation of the Board and Committees' performance and regularly reviewing progress against the improvement actions identified in 2018 > Reviewing and approving the Group's Modern Slavery Statement > Receiving regular updates on corporate governance and regulatory developments > Monitoring the amendments being made to the Group's governance arrangements to ensure full compliance with the new Code in 2019 > Completing a formal annual review of the Group's governance arrangements > Reviewing information received through the Group's Speak Up reporting processes > Renewing the Group's delegated authorities > Receiving reports from the Company's brokers on market issues

Information and support

The Board ensures that it receives, in a timely manner, information of an appropriate quality to enable it adequately to discharge its responsibilities. Papers are provided to the Directors in advance of the relevant Board or Committee meeting to enable them to make further enquiries about any matters prior to the meeting should they so wish. This also allows Directors who are unable to attend to submit views in advance of the meeting.

In addition to the formal Board processes, the Chief Executive provides written updates on important Company business issues between meetings, and the Board is provided with a comprehensive monthly report of key financial and management information, including information on safety and quality performance. Regular updates on shareholder issues are provided to the Directors, who also receive copies of analysts' notes issued on the Company. For the distribution of all information, Directors have access to a secure online portal, which contains a reference section containing background information on the Company.

All Directors have access to the advice and services of the Company Secretary. There is also an agreed procedure in place for Non-executive Directors, in the furtherance of their duties, to take independent legal advice at the Company's expense. The procedure was not utilised during the year under review.

Directors' conflicts of interest

The Board has established a formal system to authorise situations where a Director has an interest that conflicts, or may possibly conflict, with the interests of the Company (situational conflicts). Directors declare situational conflicts so that they can be considered for authorisation by the non-conflicted Directors.

In considering a situational conflict, these Directors act in the way they consider would be most likely to promote the success of the Company and may impose limits or conditions when giving authorisation or subsequently if they think this is appropriate.

The Company Secretary records the consideration of any conflict and any authorisations granted. The Board believes that the approach it has in place for reporting situational conflicts continues to operate effectively. No situational conflicts were presented to the Board for authorisation during the year under review.

Board and Committee attendance

The attendance of Directors at the Board meetings and at meetings of the principal Committees of which they are members held during 2019 is shown in the table below. The maximum number of meetings in the period during which the individual was a Board or Committee member is shown in brackets.

	Board	Audit Committee	Remuneration Committee	Nomination Committee
Chairman				
John McDonough CBE	8 (8)	—	—	6 (6)
Executive Directors				
Patrick André	8 (8)	—	—	—
Guy Young	8 (8)	—	—	—
Non-executive Directors				
Friederike Helfer ¹	n/a	—	—	n/a
Christer Gardell	7 (8)	—	—	3 (6)
Hock Goh	8 (8)	5 (5)	4 (5)	5 (6)
Jane Hinkley	7 (8)	5 (5)	5 (5)	6 (6)
Douglas Hurt	8 (8)	5 (5)	5 (5)	6 (6)
Holly Koepfel	7 (8)	5 (5)	5 (5)	5 (6)

1. Friederike Helfer was appointed to the Board at the close of the Board meeting held on 4 December 2019. No Board or Committee meetings were held in 2019 after her appointment.

Jane Hinkley and Holly Koepfel were unable to attend a Board meeting called at short notice during 2019. Hock Goh was unable to attend two scheduled Committee meetings and Holly Koepfel one scheduled Committee meeting during the year, and Christer Gardell was unable to attend one scheduled Board meeting and three Nomination Committee meetings due to clashes with other professional responsibilities that had been previously notified to the Chairman.

To the extent that Directors are unable to attend scheduled meetings, they receive the papers in advance and relay their comments to the Chairman for communication at the meeting. The Chairman follows up after the meeting in relation to the decisions taken.

The Chairman and Non-executive Directors each have a letter of appointment which sets out the terms and conditions of their directorship. An indication of the anticipated time commitment is provided in recruitment role specifications, and each Non-executive Director's letter of appointment provides details of the meetings that they are expected to attend, along with the need to accommodate travelling time. Non-executive Directors are required to set aside sufficient time to prepare for meetings, and regularly to refresh and update their skills and knowledge. Copies of all contracts of service or, where applicable, letters of appointment of the Directors are available for inspection during business hours at the registered office of the Company and are available for inspection at the location of the Annual General Meeting (AGM) for 15 minutes prior to and during each AGM.

All Non-executive Directors have agreed to commit sufficient time for the proper performance of their responsibilities, acknowledging that this will vary from year to year depending on the Group's activities, and will involve visiting operational and customer sites around the Group. The Chairman in particular dedicates a significant amount of time to Vesuvius in discharging his duties.

Directors are expected to attend all scheduled Board and Committee meetings and any additional meetings as required. Each Director's other significant commitments are disclosed to the Board during the process of their appointment and they are required to notify the Board of any subsequent changes.

The Company has reviewed the availability of the Chairman and the Non-executive Directors and considers that each of them can, and in practice does, devote the necessary amount of time to the Company's business.

Board Report continued

Composition, evaluation and succession

Appointment and replacement of Directors

The Company's Articles of Association specify that Board membership should not be fewer than five nor more than 15 Directors, save that the Company may, by ordinary resolution, from time to time, vary this minimum and/or maximum number of Directors. Directors may be appointed by ordinary resolution or by the Board. The Board may appoint one or more Directors to any executive office, on such terms and for such period as it thinks fit, and it can also terminate or vary such an appointment at any time. The Articles specify that, at every AGM, any Director who has been appointed by the Vesuvius Board since the last AGM and any Director who held office at the time of the two preceding AGMs, and who did not retire at either of them, shall retire from office. However, in accordance with the requirements of the Code, all the Directors will offer themselves for election or re-election at this year's AGM. The Board believes that each of the current Directors is effective and demonstrates commitment to his or her respective role. Accordingly, the Board recommends that shareholders approve the resolutions to be proposed at the 2020 AGM relating to the re-election of all the Directors. The biographical details of the Directors offering themselves for election and re-election, including details of their other directorships and relevant skills and experience, will be set out in the 2020 Notice of AGM. The biographical details of the Directors are also set out on pages 76 and 77.

Recommendations for appointments to the Board and rotation of the Board are made by the Nomination Committee in accordance with a rigorous procedure. The Nomination Committee is also responsible for overseeing the maintenance of an effective succession plan for the Board and senior management. Further information on the activities of the Nomination Committee is set out in the Nomination Committee report on pages 97-101.

A comprehensive induction programme is available to new Directors. The induction programme is tailored to meet the requirements of the individual appointee and the dynamics of the Group, and includes as a minimum a series of meetings with key Group executives and advisers, along with site visits to the Group's largest sites.

The Chairman, through the Company Secretary, continues to ensure that there is an ongoing process to review training and development needs. Directors are provided with details of seminars and training courses relevant to their role and are encouraged and supported by the Company in attending them. In 2020, regulatory updates were provided as a standing item at each Board meeting in a Secretary's Report. External input on legal and regulatory developments impacting the business was also given, with specialist advisers invited to the Committees' meetings to provide briefings on matters such as forthcoming accounting changes and the changing landscape of UK Corporate Governance. All Non-executive Directors are encouraged to visit Vesuvius facilities on independent visits in order to engage with employees and they relay a report of these visits to the full Board. Details of the site visits undertaken in 2019 can be found in the Chairman's statement on page 10.

Performance evaluation

The Board carries out an evaluation of its performance and that of its Committees and individual Directors, including the Chairman, every year. Details of the evaluation conducted in 2019 can be found in the Nomination Committee report.

Audit, risk and internal control

The Board is responsible for ensuring that policies and procedures are in place to ensure the independence and effectiveness of the Internal and External Audit functions. The Audit Committee assists the Board in reviewing the effectiveness of the Group's Internal and External Audit functions, in addition to monitoring the integrity of the Group's financial and narrative statements. Further information about the work of the Audit Committee can be found in the Audit Committee report on pages 89-96.

The Board is also responsible for setting the Group's risk appetite and ensuring that appropriate risk management systems are in place. The Audit Committee assists the Board in reviewing the effectiveness of the system of internal control, including financial, operational and compliance controls, and risk management systems. The Group's approach to risk management and internal control is discussed in greater detail on pages 28-31 and the Group's principal risks and how they are being managed or mitigated are detailed on pages 32 and 33. The Viability Statement which considers the Group's future prospects is included on page 31. Risk management and internal control are also discussed in greater detail in the Audit Committee report.

All of the independent Non-executive Directors serve on both the Audit and Remuneration Committees. They therefore bring their experience and knowledge of the activities of each Committee to bear when considering critical areas of judgement. This means that, for example, the Directors are able to consider carefully the impact of incentive arrangements on the Group's risk profile and to ensure that the Group's Remuneration Policy and programme are structured to align with the long-term objectives and risk appetite of the Company.

Remuneration

The Directors' Remuneration Report on pages 102-125 describes the work of the Remuneration Committee in developing the Group's policy on executive remuneration, determining Director and senior management remuneration, reviewing workforce remuneration and related policies – including ensuring that these align with the Group's strategic objectives and culture, and overseeing the operation of the executive share incentive plans.

Audit Committee

Dear Shareholder,

On behalf of the Audit Committee, I am pleased to present the Audit Committee Report for 2019. The Committee largely works to a recurring and structured programme of activities which are defined in an annual rolling Audit Committee timetable. Additional items are then added and the Committee agenda is modified as the year progresses, to accommodate new topics and priorities.

In 2019, the Committee spent some time focusing on the Group's cyber security measures following the increased profile of cyber activity and an increase in malicious 'phishing' attacks. It also continued to focus on those operational sites where our internal audit function had highlighted the need for improvements in the local control environments.

In November, the Company received a letter from the Financial Reporting Council (FRC) as part of the usual cycle of the FRC's reviews of listed companies accounts. The FRC requested additional information on the presentation and treatment of a number of items in the Company's 2018 Annual Report and Financial Statements. The Committee approved management's response after review, discussion and input from the Group's External Auditor. The FRC have closed their enquiries on several points and the Group has adopted several recommendations in preparing the 2019 Annual Report and Financial Statements. The Group has recognised a prior year restatement relating to the year ended 31 December 2017 as a result of the FRC enquiry into the application of IAS 36 Impairment of Assets. Further detail is provided in Note 17.2 to the Group Financial Statements. We remain in correspondence with the FRC in respect of their outstanding enquiries. When reviewing the Company's 2018 Annual Report and Financial Statements, the FRC has made clear to us the limitations of its review is as follows: its review is based on the 2018 Annual Report and Financial Statements only and does not benefit from a detailed knowledge of the Group's business or an understanding of the underlying transactions entered into; communications from the FRC provide no assurance that the Company's 2018 Annual Report and Financial Statements are correct in all material respects and are made on the basis that the FRC (and its officers, employees and agents) accepts no liability for reliance on them by the Company or any third party, including but not limited to investors and shareholders; and the FRC's role is not to verify information provided but to consider compliance with reporting requirements.

The Audit Committee Report describes the work of the Committee during the year, including its role in monitoring the integrity of the Company's financial statements and the effectiveness of the Internal and External Audit processes. It provides an overview of the significant issues the Committee has considered during the year and its material judgements. It also describes how the Committee fulfilled its responsibilities to assist the Board in reviewing the effectiveness of the Group's system of internal financial controls and its internal control and risk management systems.

Yours sincerely

Douglas Hurt
Chairman, Audit Committee

27 February 2020

Committee Members

Douglas Hurt (Committee Chairman)
Hock Goh
Jane Hinkley
Holly Koeppel

The Company Secretary is Secretary to the Committee.

The Audit Committee

The Audit Committee comprises all the independent Non-executive Directors of the Company, who bring a wide range of financial and commercial expertise to the Committee's decision-making processes. Douglas Hurt is the Senior Independent Director and Chairman of the Audit Committee. He was the Finance Director of IMI plc for nine years prior to his appointment and has worked in various financial roles throughout his career. Douglas currently serves as the Chairman of the Audit Committee of Countryside Properties PLC and served as the Chairman of the Audit Committee of Tate & Lyle plc until July 2019. He is a Chartered Accountant. This background provides him with the 'recent and relevant financial experience' required under the Code.

The Code and Financial Conduct Authority Disclosure Guidance and Transparency Rules also contain requirements for the Audit Committee as a whole to have competence relevant to the sector in which the Company operates. Vesuvius' Non-executive Directors have significant breadth of experience and depth of knowledge on matters related to Vesuvius' operations, both from their previous roles and from their induction and other activities since joining the Vesuvius Board. The Directors' biographies on pages 76 and 77 outline their range of multinational business-to-business experience and expertise in fields such as engineering, manufacturing, services and logistics, as well as financial and commercial acumen. The Board therefore considers that the Audit Committee as a whole has competence relevant to Vesuvius' business sector.

Meetings

The Committee met five times during 2019. The Committee has also met twice since the end of the financial year and prior to the signing of this Annual Report. The Board Chairman, the non-independent Non-executive Director, the Chief Executive, the Chief Financial Officer, the Group Financial Controller/Head of Finance, the Group Head of Internal Audit and the External Auditor were all invited to each meeting. Other management staff were also invited to attend as appropriate.

Audit Committee meetings are conducted to promote an open debate, to constructively challenge significant accounting judgements, to provide guidance and oversight to management to ensure that the business maintains an appropriately robust control environment and to provide informed advice to the Board on financial matters. The Chairman of the Audit Committee encourages open dialogue between the External Auditors, the management team and the Group Head of Internal Audit, between Audit Committee meetings to ensure that emerging issues are addressed in a timely manner.

During the year, as is the Audit Committee's established practice, the Committee members met and discussed business and control matters with senior management during site visits, informal meetings and Board presentations. The Committee also met privately with the Group Head of Internal Audit and the External Auditor without any executives present.

Audit Committee continued

The outcomes of Audit Committee meetings were reported to the Board, and all members of the Board received the agenda, papers and minutes of the Committee.

Role and responsibilities

During 2019, the main role and responsibilities of the Committee continued to be to:

- > Monitor the integrity of the Financial Statements of the Company and the Group, and any formal announcements relating to the Group's financial performance, and reviewing significant financial reporting judgements contained in them
- > Provide advice, as requested by the Board, on whether the Annual Report and Financial Statements, taken as a whole, are fair, balanced and understandable and provide the information necessary for the shareholders to assess the Group's position and performance, business model and strategy
- > Review and monitor the effectiveness of the Group's internal financial controls and the Group's internal control and risk management systems
- > Establish, as appropriate, and review procedures for detecting fraud, and systems and controls for the prevention of bribery and ensure that procedures are put in place to refer all concerns raised by employees about possible wrongdoing in financial reporting or other matters to the Committee
- > Monitor and review the effectiveness of the Company's Internal Audit function, ensuring that the function is adequately resourced and operates with appropriate independence
- > Make recommendations to the Board on the appointment, reappointment and removal of the External Auditors and approve the remuneration and terms of engagement of the External Auditors
- > Monitor and review with the External Auditors the findings of their work, including key accounting and audit judgements, how any risks to audit quality were addressed and the External Auditor's view of its interactions with senior management
- > Review and monitor the External Auditors' independence, objectivity and effectiveness, taking into consideration relevant UK professional and regulatory requirements and any FRC audit inspection findings
- > Oversee the operation of the policy on the engagement of the External Auditors to supply non-audit services
- > Report to the Board on how the Committee has discharged its responsibilities

The Committee operates under formal terms of reference approved by the Board, which were reviewed during the year. They are available in the Investors/Corporate Governance section of the Company's website, www.vesuvius.com.

Within these terms, the Committee and its individual members are empowered to obtain outside legal or other independent professional advice at the cost of the Company. These powers were not utilised during the year. The Committee may also secure the attendance at its meetings of any employee or other parties with relevant experience and expertise should it be considered necessary.

Activities in 2019

1. The Committee's agenda covered the usual standing items – the review of financial results, the effectiveness of the Group's internal financial controls, and the review of the internal control and risk management systems – as well as additional topics, including updates on cyber security and in-depth reviews of the Group's robotics sales and the Financial Operating Model.
2. In reviewing the Financial Operating Model, the Committee considered the appropriateness of the segregation of roles and duties within the Group's global finance operations, the further integration of the shared service structure and the reorganisation of formal reporting lines to improve efficiency in the analysis and communication of financial information.
3. The FRC wrote to the Company as part of its review of the Group's 2018 Annual Report and Financial Statements. The Committee has supervised the Company's response to the matters raised in their review letter. We have enhanced certain disclosures in these 2019 Annual Report and Financial Statements and have revisited our approach to impairments that has resulted in an adjustment to the opening value of goodwill and tangible fixed assets.
4. The Audit Committee continued to devote time to ensure that initiatives to mitigate potential risks and financial exposure remained robust and appropriate. The Committee challenged the assumed growth rates and discount rates used for asset impairment assessments.
5. The Committee considered the Company's going concern statement and challenged the nature, quantum and assessment of the significant risks to the business model, future performance, solvency and liquidity of the Group that were modelled as part of the scenarios and stress testing undertaken to support the Viability Statement made by the Company in the 2018 Annual Report and Financial Statements. The 2019 Viability Statement, which was also critically reviewed, is contained within the Strategic Report and can be found on page 31.
6. The Committee monitored the resourcing and delivery of the 2019 Internal Audit plan and approved the 2020 Internal Audit plan. The Committee monitored both the responses from and follow-up by management to Internal Audit recommendations arising during the year.
7. The Committee approved enhancements to the Internal Audit approach through 2019 with the introduction of Trial Balance Deep Dive audits and for smaller entities Financial Controls Healthcheck audits which establish whether more extensive Internal Audit attention is warranted.
8. The Committee discussed at length significant issues raised, the root causes for those issues and the actions being taken to resolve the issues.
9. The Committee conducted regular, detailed reviews of provisions, challenging the reasonableness of underlying assumptions and estimates of costs and the quantum of any related insurance assets.
10. The Committee considered the impact of new accounting standards. IFRS 16 Leases and IFRIC 23 Income Taxes were effective from 1 January 2019 and the Committee reviewed their impact on the Group Financial Statements.
11. The Committee reviewed its terms of reference.
12. The Committee reviewed the effectiveness of the External Audit process.

The Committee members believe that they received sufficient, relevant and reliable information throughout the year from management and the Internal and External Auditors to enable the Committee to fully discharge its responsibilities. The work of the Audit Committee is further elaborated in the paragraphs below.

Statement of compliance with the Competition and Markets Authority (CMA) Order

The Committee considers that the Company has complied with The Statutory Audit Services for Large Companies Market Investigation (Mandatory Use of Competitive Processes and Audit Committee Responsibilities) Order 2014 (Article 7.1), published by the CMA on 26 September 2014, including with respect to the Audit Committee's responsibilities for agreeing the audit scope and fees and authorising non-audit services.

Financial reporting

The Committee fulfilled its primary responsibility to review the integrity of the 2019 half-year and 2019 annual Financial Statements and recommended their approval to the Board.

In forming its views, the Committee assessed:

- > The quality, acceptability and consistency of the accounting policies and practices
- > The clarity and consistency of the disclosures, including compliance with relevant financial reporting standards and other reporting requirements
- > Significant issues where management judgements and/or estimates had been made that were material to the reporting or where discussions had taken place with the External Auditors in arriving at the judgement or estimate
- > In relation to the overall Annual Report, whether the Annual Report and Financial Statements taken as a whole were fair, balanced and understandable, taking into consideration all the information available to the Committee
- > The application of the FRC's guidance on clear and concise reporting
- > The disclosure and presentation of alternative performance measures, in view of the guidelines issued by the European Securities and Markets Association

The Committee actively deliberated and challenged reports from the Chief Financial Officer and the Group Financial Controller/Head of Finance. These were well prepared and, for areas of judgement and/or estimation, set out the rationale for the accounting treatment and disclosures, and the pertinent assumptions and the sensitivities of the estimates to changes in the assumptions. PwC also delivered memoranda for the half-year and year-end, stating its views on the treatment of significant issues. PwC provided a summary for each issue, including its assessment of the appropriateness of management's judgements or estimates.

Significant issues and material judgements

The Committee considered the following significant issues in the context of the 2019 financial statements. It identified these areas to be significant, taking into account the level of materiality and the degree of judgement exercised by management.

The Committee resolved that the judgements and estimates made on each of the significant issues detailed below were appropriate and acceptable. It is considered that judgements and estimates in relation to income tax and provisions are considered critical in the context of the 2019 Financial Statements as listed in Note 3 to the Group Financial Statements.

Impairment of intangible assets

The FRC wrote to the Company as part of its review of the 2018 Annual Report and Financial Statements. In response to one of the matters they raised, the Company has revisited its approach to impairments to comply with IAS 36 Impairment of Assets. The Committee has reviewed and challenged management's proposals to effect this change and in so doing, the forecasts for the Steel Digital Services operating segment have been revisited as at 31 December 2017 and 31 December 2018. The Committee concurs with this change requiring an impairment to write off the value of this cash-generating unit (CGU's) goodwill of £17.4m at 31 December 2017.

The 2019 year-end carrying value of goodwill of £620.2m was tested against the current and planned performance of the Steel Advanced Refractories, Steel Flow Control and Foundry CGUs. The Committee considered the Board-approved medium-term business plans, the terminal growth assumptions as well as the discount rates used in the assessments and the relevant sensitivities that were evaluated. The detailed assumptions, provided in Note 17 to the Group Financial Statements, reflect an increase in the equity risk premium, partially offset by a reduction in global risk-free rates. These changes are not specific to Vesuvius.

Given that the models indicated that there remains significant headroom between the value in use and the carrying value, the Committee concurred that no goodwill impairment charges were required.

Income tax

Income tax remains a complex area where significant judgements are required to estimate both uncertain tax liabilities and the value of deferred tax assets.

The Committee challenged the assumptions used to arrive at the £14.3m (2018: £29.3m) provided for income tax payable which includes £11.8m (2018: £20.2m) for uncertain tax provisions as set out in Note 10.5 to the Group Financial Statements. After discussions with internal tax experts and considering the results of recent tax audits and the views of the External Auditors, the Committee concurred with management's judgement.

Audit Committee continued

At the end of 2019, the Group recognised a US deferred tax asset of £61.3m (2018: £67.3m). The recognition of deferred tax assets for tax losses and other temporary differences is a highly technical area and the Committee has drawn on internal experts to understand the treatment. Following the significant increase in US deferred tax asset recognition in 2018, the Committee reviewed the Group's projections for trading in the US and concurred with management that the US forecast profits are considered sufficient to sustain the deferred tax asset in the US at the end of 2019.

In light of the substantial recognition on the Group's balance sheet of the US tax losses and other temporary differences, the Committee considered that the utilisation of these deferred tax assets, which offset the Group's US taxable headline profits, should continue to be reflected as part of the Group's headline tax charge.

Other provisions

The Committee has been made aware of a number of potential exposures and claims arising from ongoing litigation, product quality issues, employee disputes, restructuring, environmental matters, onerous leases, indirect tax disputes and indemnities or warranties outstanding for disposed businesses. Due to the long gestation period before settlement can be reached, provisioning for these items requires careful judgement in order to establish a reasonable estimate of future liabilities. The Committee also assessed the strength of any insurance coverage for certain of these liabilities and challenged the accounting treatment for any amounts deemed to be recoverable from insurers. After due consideration and challenge, with expert advice sought in certain areas, the Committee is satisfied that there are appropriate levels of provisions set aside to settle third-party claims and disputes (Note 30 to the Group Financial Statements) and that adequate disclosure has been made. Where the outcome of an existing issue is uncertain, or where no reliable estimate of the potential liability can be made, no provision has been made and appropriate disclosure is included under contingent liabilities (Note 32 to the Group Financial Statements).

Restructuring charges

During 2019, the Group's restructuring programmes were expanded and intensified. The Committee critically reviewed the treatment of the restructuring costs disclosed as separately reported items in 2019 and concluded that these have been treated consistently with the accounting policy. This ensures that only significant restructuring programmes that have a defined scope and are material in nature are reported separately, which enables a clearer understanding of the underlying results of the Group.

Impairment of investment in subsidiaries

The Committee has also reviewed management's impairment analysis of the parent company's investment in subsidiaries. Whilst it concurred that no impairment is required, it agreed that additional disclosure was required around the sensitivity of the forecasts to reasonably possible changes in certain assumptions which might require an impairment in 2020.

Fair, balanced and understandable reporting

The Committee considered all the information available to it in reviewing the overall content of the Annual Report and Financial Statements and the process by which it was compiled and reviewed, to enable it to provide advice to the Board that the Annual Report and Financial Statements are fair, balanced and understandable. In doing so, the Committee ensured that time was again dedicated to the drafting and review process so that internal linkages were identified and consistency was tested. Drafts of the Annual Report and Financial Statements were also reviewed by a senior executive not directly involved in the year-end process who reported to the Committee on his impressions of clarity, comprehensiveness, balance and disclosure in the document.

On completion of the process, the Committee was satisfied that it could recommend to the Board that the Annual Report and Financial Statements are fair, balanced and understandable.

Risk management and internal controls

As highlighted in the reviews of strategy and principal risks in the Strategic Report, risk management is inherent in management's thinking and is embedded in the business planning processes of the Group. The Board has overall responsibility for establishing and maintaining a system of risk management and internal control, and for reviewing its effectiveness. 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. This framework is consistent with the Code.

In 2019, Committee members fully participated in the Board review of existing risks and ongoing mitigating actions, further details of which are given on pages 32 and 33. The Committee believes that the Group's process for identifying and understanding its principal risks and uncertainties remains robust and appropriate.

The Committee considered the Company's going concern statement and challenged the nature, quantum and effects of the combination of the unlikely but significant risks to the business model, future performance, solvency and liquidity of the Group. These were all modelled as part of the scenarios and stress testing undertaken to support the Viability Statement. As part of this review, the Committee considered the Group's forecast funding requirements over the next three years and analysed the impact of key risks faced by the Group with reference to the Group's debt covenants. The scenarios considered the impact of multiple risks occurring simultaneously and the additional mitigating actions that the Group could take. The Committee noted that the Group's debt headroom was sufficient to accommodate the modelled stress scenarios. As a result of its review, the Committee was satisfied that the going concern statement and Viability Statement had been prepared on an appropriate basis. The 2019 going concern statement and the 2019 Viability Statement are contained within the Risk, viability and going concern section on page 31.

The key features of the Group's internal control system, which provides assurance on the accuracy and reliability of the Group's financial reporting, are detailed in the Risk, viability and going concern section on pages 28-33. During 2019, the Committee considered the process by which management evaluates internal controls across the Group. The Group Head of Internal Audit provided the Committee with a summary overview of the assurance provided by the Group's control framework and the testing of these controls. PwC also reviewed controls in the businesses within the scope of its audit.

The Group is made up of several large operating units, but also many small units in geographically diverse locations. Consequently, segregation of duties, overlapping access controls on systems and remote management oversight can give rise to control vulnerabilities and fraud opportunities. The Group has not adopted a common Enterprise Resource Planning system as a Group-wide standard. Over time, the Group is moving towards a shared services model, enabled by control, process and systems standardisation between businesses. This is expected to enhance the overall internal control environment in the smaller operating units.

The Group undertakes a range of activities to mitigate the risk of fraud. This framework is regularly reviewed to determine areas for improvement. Eliminating the risk of fraud remains one of the key areas of focus for Internal Audit, forming a fundamental part of 'full scope' and financial audits. These assess the quality of the balance sheet reconciliations, review key judgement matters, consider ERP access rights, review tenders and quotations, review the entity's controls over master data changes, and review controls over payments, journals and associated applications.

Any control issues identified by management locally or as a result of the work performed by Internal Audit are escalated as appropriate. Internal Audit rate all control issues they identify in terms of their significance and agree remediation plans with the Auditee and an Action Owner, establishing a target date for remediation. For significant issues, management at all levels within the business are engaged to agree the actions and remediation dates. The status of the remediation is monitored and overdue issues are reported at Audit Committee meetings. The Audit Committee continues to challenge management on the root cause for issues arising and on the progress of remediation activities.

In the first quarter of 2019, Vesuvius experienced a heightened number of 'phishing' emails presenting fake credentials. A small number of breaches were identified stemming from the receipt of these emails which were addressed immediately with the support of external cyber security specialists. No financial loss arose as a result of these breaches. Consequently, the internal training programme on cyber/IT security was further enhanced and a programme of work was commenced to strengthen Vesuvius' overall IT security.

During 2019, the Group continued its review of third-party representatives and intermediaries. This included detailed due diligence for active sales agents and custom clearance agents. The Committee also continued its assessment of the Group's potential exposure to bribery and corruption risks, noting the ongoing work conducted by the Group in this context, such as face-to-face visits to operations, providing focused, country-specific training and reviewing financial records. The output

of these processes and previous risk assessments continue to be used to develop Group policies and procedures for the management of anti-bribery and corruption risk, reflecting an appropriate level of control for the business.

In line with the requirements of the new Code, responsibility for the oversight of and monitoring of the Group's Speak Up helpline, which collates allegations of improper behaviour and employee concerns, passed from the Audit Committee to the full Board. Procedures remain in place for any complaints received by the Company regarding fraud, accounting, internal accounting controls and auditing matters, to be passed to the Audit Committee for review and appropriate follow-up action. Further details of the operation of the Group's Speak Up policy and helpline can be found in the Our principles section of the Annual Report on pages 54-57.

Each year, the senior financial, operational and functional management of the businesses self-certify compliance with Group policies and procedures for the areas of the business under their responsibility and confirm the existence of adequate internal control systems throughout the year. The Committee reviews any exceptions noted in this bottom-up exercise.

The work undertaken during the year indicated the existence of an appropriate control environment, albeit with some areas for improvement, for which clearly defined improvement actions have been identified, particularly in respect of the Group's cyber risks. No significant control issues were raised by our External Auditors, PwC and Mazars, and no material issues were identified in 2019. After considering these various inputs, the Committee was able to provide assurance to the Board on the effectiveness of internal financial control within the Group, and on the adequacy of the Group's broader internal control systems.

Internal Audit

The Group's Internal Audit function operates on a global basis through professionally qualified and experienced individual members located around the world. They report to the Group Head of Internal Audit, based in London, who in turn reports directly to the Chairman of the Audit Committee.

Throughout 2019, Internal Audit primarily performed Compliance & Control (C&C) audits which focus on internal financial controls and key Board compliance issues. Effectiveness & Efficiency (E&E) audits, which focus on a broader range of business performance issues, are only performed in response to a direct request from management. This approach allows the Audit Committee to concentrate on key control issues for resolution. Over the course of 2019, Internal Audit modified its audit approach to include detailed review of the Trial Balance and its underlying transactions. These Trial Balance Deep Dive Audits resulted in the identification of several control issues. The actions being taken to address these issues have been discussed at length at Audit Committee meetings with regular updates on the progress made. In addition, Financial Controls Health Check Audits have been introduced. These allow the audit coverage to be extended by including the smaller entities which are audited less often. Each entity is requested to provide key financial data and evidence of key reconciliations. This is subject to a remote desktop review. In instances where the initial documentation provided is judged not to be 'fit for purpose', a site visit is arranged and more detailed audit work performed.

Audit Committee continued

The Committee received, considered and approved the 2019 Internal Audit plan, which was constructed using a risk-based approach to cover the Group's control environment. The plan was based on the premise that all operating units are audited at least once every three years, including the smaller operating units. Internal Audit annually audits each of the large operating entities located in Germany, the US, China, Mexico and Brazil. During the year, the Committee also considered and approved changes to the Internal Audit plan as required.

In 2019, a total of 29 audit assignments, including three 'Deep-Dive' audits, were undertaken, covering 48% of the Group's revenue and 69% of the Group's profit before tax. The Committee received a report from the Group Head of Internal Audit at each of its meetings detailing progress against the agreed plan, key trends and findings, and an update on the progress made towards resolving open issues. Common themes emerging from Internal Audit reports coupled with Internal Audit and management's assessment of risk have informed the development of the 2020 Internal Audit plan.

When necessary, Internal Audit uses External Auditors to supplement internal resources on an ad hoc basis. Individuals are usually sourced for their technical expertise in a particular area. The process provides valuable learning opportunities and we expect to continue to use external auditors to supplement internal audits in specialist areas and geographies in the future.

Control issues continue to be recorded in a live web-based database into which management is required to report progress towards addressing any open issues. Internal Audit monitors the progress made and frequent meetings continue to be held with each business unit President to ensure that engagement on the resolution of issues is clearly understood at all levels of the business and responsibility for remediation has been appropriately assigned. The results are communicated to the Audit Committee which also involves senior management as necessary to provide an update against any high-priority actions and Internal Audit undertakes follow-up reviews as required. In situations where audit findings required longer-term solutions, the Committee oversaw the process for ensuring that adequate mitigating controls were in place.

During the year, an internal review was undertaken of the effectiveness of the Internal Audit function, canvassing the views of the Divisional Finance Vice Presidents and business unit Presidents. This highlighted increasing satisfaction with the relevance and value of issues raised, and the quality of reporting. It did, however, highlight the need to continue to upgrade the skills and capabilities of the Internal Audit function, particularly in light of the loss of the IT specialist, and action is being taken to further strengthen the team.

Having considered the work of the Internal Audit function during 2019, including progress against the 2019 Internal Audit Plan, the quality of reports provided to the Committee, and the results of the review of the function's effectiveness, the Committee concluded that the Internal Audit function operated effectively during 2019.

External audit

Auditors' appointment

In 2017, the Company appointed PricewaterhouseCoopers LLP (PwC) as External Auditors to the Company and the Group and Mazars LLP to audit the non-material entities within the Group. PwC nominated Julian Jenkins as the audit partner responsible for the Group audit. In line with the regulations on auditor rotation, the external audit contract will be put out to tender at least every ten years. In addition, PwC will be required to rotate the audit partner every five years.

2019 Audit plan

PwC's 2019 year-end audit plan was based on objectives agreed with management as part of the FY2018 audit debrief. The audit focused on areas identified as representing significant risk and requiring significant judgement. PwC maintained an ongoing dialogue with the Audit Committee throughout the year providing regular updates, including commentaries on significant issues and its assessment of consistency and appropriateness in the judgements and estimates made by management. Private sessions were held with PwC without management being present. PwC confirmed that its work had not been constrained in any way and that it was able to exercise appropriate professional scepticism and challenge throughout the audit process. The Chairman of the Audit Committee met on a number of occasions with PwC to monitor the progress of the audit and discuss questions as they arose.

The Independent Auditors' Report provided by PwC on pages 132-138 includes PwC's assessment of the key audit matters. These key audit matters are discussed in the significant issues and material judgements comments above. The report also summarises the scope, coverage and materiality levels applied by PwC in its audit. As part of the audit planning process and based on a detailed risk assessment, the Committee agreed a materiality figure of £8.6m for Group financial reporting purposes which is lower than last year (£9.4m) and, in line with similar groups, is set at 5% of headline profit before tax of £171.4m. Importantly, much lower levels of materiality are used in the audit fieldwork on the individual businesses across the Group and these lower figures drive the scope and depth of audit work. Any misstatement at or above £0.43m was reported to the Committee.

There were no significant changes this year to the coverage of the audit which stood at 69% of the Group's revenue, 76% of profit before tax and 64% of headline profit before tax. This coverage was considered to be sufficient by the Committee. The audit coverage is reflective of the long tail of smaller businesses within the Group that individually are not 'material' to the Group result.

The Committee also received a report from Mazars during the year summarising the findings and recommendations from its statutory audits for the year ended 31 December 2018 of the non-material Group subsidiaries and management agreed to implement certain of these recommendations.

The PwC audit fee approved by the Audit Committee was £1.8m. This was constructed bottom up on a local currency basis and was assessed in light of the audit work required by the agreed materiality level and scope. The fee agreed with Mazars for the audit of the non-material entities was £0.5m, resulting in a combined audit fee with PwC of £2.3m, compared with £2.2m in 2018.

Independence and objectivity

The Committee is responsible for safeguarding the independence and objectivity of the External Auditors in order to ensure the integrity of the external audit process. In discharging this responsibility during 2019, the Committee:

- > Sought regular confirmation from the incumbent External Auditors that they considered themselves to be independent of the Company in their own professional judgement, and within the context of applicable professional standards
- > Assessed the External Auditors' work and considered whether they were exercising an appropriate level of professional scepticism
- > Evaluated all the relationships between the External Auditors and the Group, including compliance with the Group's policy on the employment of former employees of the External Auditors, to determine whether these impaired, or appear to impair, the Auditors' independence
- > Reviewed compliance against the policy on the provision of non-audit services by the External Auditors
- > Reviewed details of the non-audit services provided by the External Auditors and associated fees

As a result of its review, the Committee concluded that PwC remained appropriately independent.

Non-audit services

Vesuvius operates a policy for the approval of non-audit services. A copy of the current policy is available to view on the 'Investors/Corporate Governance' section of the Company's website, www.vesuvius.com. In 2019, Group companies were not permitted to use the External Auditors for any 'prohibited non-audit services' as specified by the UK Financial Reporting Council's (FRC's) Revised Ethical Standard 2016, unless subject to a permitted derogation.

The restrictions broadly prohibited External Auditors' involvement in tax services, any services that involve playing a part in management decision-making, preparing accounting records, designing or implementing internal control/risk management services or financial systems, certain HR services and other legal, investment and share-dealing services. The External Auditors could be invited to provide non-audit services which, in their position as External Auditors, they must or were best placed to undertake and which did not impact on auditor objectivity or independence. All audit-related and permissible non-audit services proposed to be carried out for any Group company worldwide by the External Auditors had to be pre-approved by the Chief Financial Officer, who thereafter was required to refer matters to be further approved by the Chairman of the Audit Committee or the full Audit Committee before an engagement was agreed. Any assignment proposed to be carried out by the External Auditors also had to be cleared by the External Auditors' own internal pre-approval process to confirm the firms' ethical ability to do the work.

In practice, the Group did not seek to engage PwC for non-audit services during 2019 except for audit related services that are required to be performed by an auditor. In 2019, the fees for non-audit services payable to PwC amounted to £0.1m (2018: £0.1m). The 2019 fees represent payment for assurance services related to the review of the Group's half-year financial statements, quarterly reviews and tax form audits in India (as required by regulation).

In light of the FRC's publication of a revised 2019 Ethical Standard, the Committee has approved a revised Non-audit Services Policy to comply with the new Standard. This new Policy takes effect from 15 March 2020. The Group is not currently sourcing any services from the External Auditors that would not meet the new criteria in the revised Standard.

Effectiveness of PwC

The Committee and the Board are committed to maintaining the high quality of the external audit process. Each year the Committee carries out a formal assessment of the performance of the External Auditors. Input into the evaluation was obtained from management and other key Company personnel, members of the Audit Committee and the External Audit team. The review focused on the External Auditor's mindset and culture, skills, character and knowledge, and the quality of its controls, as set out in the guidance for audit committees prepared by the FRC.

In 2019, the evaluation of the External Auditors included the following steps:

- > a survey of key finance and non-finance stakeholders in Head Office and in-scope countries
- > a commentary-based survey of Audit Committee members focused on their experience of working with PwC
- > consideration of PwC's approach to assessing the risks to its audit quality and an evaluation of the actions it had taken to mitigate these
- > a review of other external evidence on PwC audit quality (e.g. report on PwC by the FRC)
- > an assessment against the objectives outlined in PwC's Audit Objectives report
- > discussions with PwC and key finance and non-finance personnel

The evaluation concluded that PwC provided an effective audit for the 2018 financial year, building on its experience from the prior year to improve the efficiency and effectiveness of the audit, with improved communication between the Group and PwC's local teams and earlier planning of year-end processes. The PwC team was noted to exhibit strong technical expertise and appropriate challenge and was seen as independent by the Audit Committee and management. PwC was deemed to have provided an objective and challenging audit process for 2018. Debrief meetings were held at a local level to facilitate further improvements to the audit planning for the 2019 audit.

Audit Committee continued

Reappointment of PwC for 2020

The Committee is responsible for making recommendations to the Board in relation to the appointment, reappointment and removal of the External Auditors. In undertaking this duty, the Committee takes into consideration a number of factors concerning the Auditor and the Group's current activity, including:

- > the results of its most recent review of the effectiveness of the Auditors
- > the results of its review of the independence and objectivity of the Auditors, particularly in light of the provision of non-audit services
- > its ability to coordinate a global audit, working to tight deadlines
- > the cost-competitiveness of the Auditors in relation to the audit costs of comparable UK companies
- > the tenure of the incumbent Auditors
- > the periodic rotation of the senior audit management assigned to the audit of the Company

In addition, the Committee considers external reviews of the performance and quality of the Auditors, including:

- > the annual report issued by the Audit Inspection Unit of the Financial Reporting Council on the work of the Auditors
- > the Auditors' own annual Transparency Report

Having considered the aforementioned factors, the Committee decided to recommend to the Board that PwC be reappointed for 2020. It confirms that its recommendation is free from the influence of any third party and that there are no contractual restrictions on the choice of auditor. A resolution proposing the reappointment of PwC is included in the notice of AGM for 2020.

The Committee noted the ruling by the Securities Exchange Board of India (SEBI) regarding the prohibition placed on PwC network companies performing audits of listed entities for two years from 1 January 2018. This allowed a transitional period and the audit of Vesuvius entities in India remained permissible for the year ended 31 December 2018. PwC subsequently won the appeal at the Securities Appellate Tribunal (SAT) allowing PwC to continue with existing audits of listed companies. SEBI appealed against the SAT order in November 2019 and this was stayed by the Supreme Court pending final disposal of the appeal. For the rest of the order, dealing with the ban, there has not been any hearing and no date has been fixed. The Committee continues to monitor developments on this matter in the context of the Group's two listed Indian subsidiaries, Foseco India Limited and Vesuvius India Limited. The Group has contingency plans in place should PwC not be able to continue to audit the Group's entities in India.

Audit Committee evaluation

The Audit Committee's performance was evaluated as part of the overall externally facilitated Board and Committee performance evaluation, which is described in depth on page 100. The overall performance of the Audit Committee was rated highly, with the quality of the information provided to the Audit Committee stated to be of good quality and continuing to improve. The relationship and communication between the Audit Committee and the Chief Financial Officer and his team, the Head of Internal Audit and the External Audit Partner received high ratings and, again, an improvement over the past year was observed. The detailed reviews and reporting from Internal Audit were commented on favourably and the newly implemented deep-dive internal audits were felt to have greatly improved the performance of Internal Audit. The Audit Committee's review and monitoring of the work of the External Auditors was also rated highly, with the Committee being engaged in an open, rigorous review and discussion. It was concluded that the Committee operated effectively to review the work of the Internal and External Auditors, to provide appropriate challenge to management's assessment of significant audit issues and material accounting judgements, and to have appropriate oversight of the Group's risk management and internal control systems.

A number of priorities were identified for the Audit Committee over the coming year, including reviewing the existing finance organisational structure to ensure that it is appropriate to meet the future needs of the Group, driving further improvements in the standardisation, accuracy and reliability of accounting and financial control practices.

On behalf of the Audit Committee

Douglas Hurt
Chairman, Audit Committee

27 February 2020

Nomination Committee

Dear Shareholder,

On behalf of the Nomination Committee, I am pleased to present the Nomination Committee Report for 2019. The primary responsibility of the Nomination Committee is to focus on Board composition and succession planning to ensure that the Board is made up of individuals with the appropriate drive, abilities, diversity and experience to lead the Company in the delivery of its strategy.

As part of this work, the Committee is also responsible for overseeing the succession plans that are in place for senior management to ensure that there is a consistent pool of diverse talent as a pipeline for future progression to the Board.

The Committee reviews the current and future needs of the Board and its Committees on an ongoing basis and, as part of the annual corporate governance review conducted each year, examines the independence and diversity of the Board and the balance of skills and development needs of Board members. During 2019, the Committee reviewed the tenure of all of the Directors and discussed future Board composition, noting that myself and Jane Hinkley would reach our ninth anniversaries, and Hock Goh and Douglas Hurt their sixth anniversaries, of appointment to the Board in 2021. The Committee has discussed the optimum timing and the appropriate steps required to address a rotation of Board membership whilst minimising risk.

During the year, the Nomination Committee also oversaw the process for the appointment of Friederike Helfer, a Partner in Cevian Capital, the Group's largest shareholder, who became a new non-independent Non-executive Director, when Christer Gardell, who is Managing Partner at Cevian Capital, stepped down from the Board in December.

Yours sincerely

John McDonough CBE
Chairman, Nomination Committee

27 February 2020

Committee members

John McDonough CBE (Committee Chairman)
Christer Gardell – served on the Committee until his retirement from the Board on 4 December 2019
Hock Goh
Friederike Helfer – joined the Committee on her appointment to the Board on 4 December 2019
Jane Hinkley
Douglas Hurt
Holly Koeppel

Meetings

The Committee met six times during the year.

Key activities during the year

- > **Board composition:** The Committee reviewed the structure, size and composition of the Board, including the skills, knowledge and experience required for the Board to continue to function effectively, taking into consideration the need to ensure an appropriate balance of independence and diversity amongst Board members. The Committee then evaluated the current Board composition against an assessment of these future business needs.
- > **Board succession:** The Committee reviewed the ongoing requirements for Board composition to maintain the correct skills, experience, independence and diversity at Board level, in light of the tenure of existing Directors. The Committee oversaw the recruitment process to appoint Friederike Helfer, a Partner in Cevian Capital, as a Non-executive Director following Christer Gardell's indication that he wished to step down from the Board.
- > **Senior management succession:** The Committee reviewed the Group's succession processes for the Group Executive Committee and the management cadre below this level. It also examined how the Group's talent management processes operate, how the new cohort of senior managers who joined the Group over the past 18 months were being integrated and how the development of individuals flagged as 'high potential' was proceeding.
- > **Diversity:** The Committee reviewed and approved the Group's proposal for a formal Group Diversity Policy, which emphasised the Group's commitment to a diverse and inclusive workforce, and approved the integration into this policy of an updated Board diversity objective. See page 99.
- > **Directors' elections:** The Committee considered the Directors' annual re-elections at the AGM.
- > **Committee evaluation:** The Committee reviewed its performance and effectiveness during 2019, including evaluating whether each Non-executive Director was spending sufficient time fulfilling their duties.
- > **Committee terms of reference:** The Committee reviewed its terms of reference.

Nomination Committee continued

The Nomination Committee

The Nomination Committee is made up of me, as Chairman of the Company, and any three of the Non-executive Directors. During the year, I continued as Chairman of the Committee, though I did not act as Chairman when the Committee was discussing issues surrounding my succession, when Douglas Hurt our Senior Independent Director served as Chairman in my place. The Company Secretary is Secretary to the Committee. Members' biographies are set out on pages 76 and 77.

Role and responsibilities

The Nomination Committee's foremost priorities are to ensure that the Company has the best possible leadership, to oversee the process for Board appointments, ensure plans are in place for orderly succession to both the Board and Senior Management (being the Group Executive Committee) positions, and oversee the development of a diverse pipeline for succession. The Committee ensures that the procedure for the selection of potential candidates for Board appointments – either as an Executive Director or independent Non-executive Director – is formal, rigorous and transparent and undertaken in a manner consistent with best practice. It also ensures that appointments to the Board are made on merit, against objective criteria and with due regard for the benefits of diversity of gender, social and ethnic backgrounds, and cognitive and personal strengths on the Board. The Nomination Committee advises the Board on appointments, retirements and resignations from the Board and its Committees.

The Committee operates under formal terms of reference which were reviewed during the year. A copy of these terms of reference is available on the Group's website www.vesuvius.com.

The Committee and its members are empowered to obtain outside legal or other independent professional advice at the cost of the Company in relation to its deliberations. These rights were not exercised during the year. The Committee may also secure the attendance at its meetings of any employee or other parties it considers necessary.

Process for Board appointments

The Committee follows formal, rigorous and transparent procedures for the appointment of new Directors. When considering a Board appointment, the Nomination Committee draws up a specification for the role, taking into consideration the balance of skills, knowledge and experience of its existing members, the diversity of the Board, the independence of continuing Board members, and the ongoing requirements and anticipated strategic developments of the Group. The search process is then able to focus on appointing a candidate with the necessary attributes to enhance the Board's performance.

With regard to the appointment of Friederike Helfer during the year, the Committee undertook a shortened process following her nomination by Cevian Capital, which holds 21.11% of Vesuvius' issued share capital, as a suitable representative for Cevian on the Board, following Christer Gardell's indication that he wished to step down. The Board considered and confirmed that it remained beneficial to have a representative from Cevian at the Board table and, consequently, Ms Helfer's credentials were reviewed and external references taken up. She also confirmed that she had sufficient time available to devote to the role. Members of the Board met with Ms Helfer in a series of formal and informal meetings and provided feedback to the Nomination Committee.

Based upon the outcome of this process, the Nomination Committee recommended that she be appointed to serve as a non-independent Non-executive Director in place of Christer Gardell, who stepped down from the Board immediately prior to her appointment.

In the ordinary course, the Committee uses the services of search firms to identify appropriate candidates, ensuring that any selected firm is not in any way conflicted in the delivery of its role. The Committee only uses those firms that have adopted the Voluntary Code of Conduct addressing gender diversity and best practice in search assignments.

The Committee begins the recruitment process by reviewing the skills and attributes required for the role and agreeing a job specification. The Committee then selects a suitable search firm for the assignment based on its skills, expertise and price. Searches are conducted globally and a longlist of diverse potential appointees is produced. For Executive Director positions, internal candidates are also considered. The Committee reviews the longlist, and a shortlist of candidates for interview is drawn up based upon the objective criteria identified at inception. The initial shortlist of candidates is interviewed by members of the Nomination Committee. The preferred candidate then meets with the other Board members. Finally, detailed external references are taken up and following this the Committee makes a formal recommendation to the Board for the appointment of the preferred candidate. The candidate is then supported in undertaking their own due diligence on the Company and meeting with its advisers. For non-executive appointments, candidates are also required to demonstrate that they have sufficient time available to devote to the role and to identify any potential conflicts of interest.

Following a new appointment, the Committee continues to monitor the development and integration onto the Board of the new Director. They undertake a full induction programme, continuing to gain insight into the business and meeting executives throughout the organisation. Following her appointment, Ms Helfer has embarked on an induction programme encompassing meetings with key Group executives, outside advisers and visits to key operational sites.

Board composition

On an ongoing basis, the Committee reviews the current and future needs of the Board and its Committees – reflecting on the balance of skills, knowledge and experience of current Directors and comparing this against the Board's list of key skills. The independence and diversity of the Board and the balance of skills, experience and development needs of Board members are examined as part of the annual corporate governance review. The Committee also takes into consideration the results of the Board evaluation process each year. In 2019, the evaluation highly rated the size of the Board, the skills and experience represented and the level of diversity amongst Directors, and considered the future skills requirements of the Board. The importance of the Board possessing knowledge of the Company's geographic markets and continuing to focus on diversity was re-emphasised. The Committee's key skills matrix was reviewed in light of the outcome of these deliberations. On an ongoing basis, the Committee considers existing lengths of tenure and the prospective rotation and retirement of Board members, so that it can plan succession accordingly.

Diversity

Vesuvius recognises the value of a diverse and skilled workforce and is committed to creating and maintaining an inclusive and collaborative workplace culture that will provide sustainability for the organisation into the future. We believe that the dedication and professionalism of our people is the most significant contributor to our success. Having a balance of cultures, ethnicities and genders helps to promote innovation and creativity, and the diversity of our employees is one of the core strengths of the Group.

During the year, the Committee approved the adoption of a formal Group Diversity Policy. This outlines Vesuvius' commitment to encouraging a supportive and inclusive culture amongst its global workforce, promoting diversity and eliminating any potential discrimination in our work environment.

As an organisation, Vesuvius has a global, multicultural operational and customer base, and we wish to reflect that inside our organisation with a multiculturally diverse community of excellent professionals of all backgrounds at Vesuvius. This starts by focusing on broad diversity of gender and nationality, with an aim to ensure that all employees and job applicants are given equal opportunity and that our organisation is representative of all sections of society where we operate. Each employee is respected and valued and able to give their best as a result. All employees are given help and encouragement to develop their full potential and utilise their unique talents.

In turn, a more diverse leadership group will result. We expect that Vesuvius' leadership population should increase in diversity significantly over the next two to five years, in terms of age, gender, ethnicity, length of service and education background.

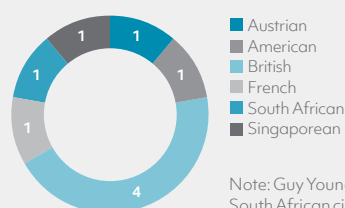
In line with the Group's global commitment to diversity, the Nomination Committee focuses on ensuring that both the Board and its Committees have the appropriate range of diversity, skills, experience, independence and knowledge of the Company, and the markets in which it operates, to discharge its duties and responsibilities effectively. We continue to look at diversity in its broadest sense – reflected in the range of backgrounds and experience of Board members who are drawn from different nationalities and have managed a variety of complex global businesses. The Nomination Committee recognises that diversity is a key ingredient in creating a balanced culture for open discussions at Board level and in minimising 'groupthink'.

The Board's overall skills and experience, as well as Non-executive Director independence, were reviewed during the year. The Board's composition also formed part of the Board evaluation process. During the year, Christer Gardell stepped down from the Board and Friederike Helfer was appointed in his place, increasing the number of women serving on the Board from two to three (25% to 37.5%) and resulting in the Board reaching its target of achieving at least 33% female membership. Four Directors are non-UK citizens. The Board also contains individuals from a range of ethnic backgrounds. The Board considers its diversity, size and composition to be appropriate for the requirements of the business.

The new Group Diversity Policy confirms the Group's commitment to maintaining a Board comprising at least 33% female membership, while continuing to appoint candidates based on merit and recognising that over time the proportion of female Directors will fluctuate naturally as Board members retire and new Directors are appointed.

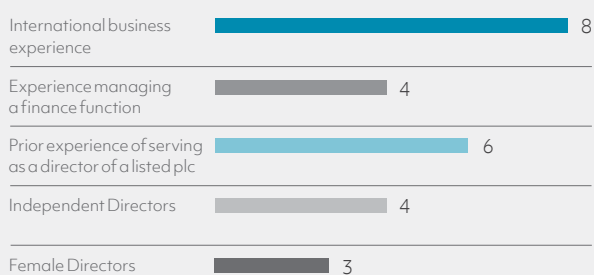
Further information on the Group's approach to promoting diversity can be found on pages 68-73.

Board nationalities



Note: Guy Young has dual UK and South African citizenship

Board composition



As at 31 December 2019, the gender balance of the Group's employees was as follows:

	Female	Male	Total	Female	Male
Group Executive Committee member	2	6	8	25%	75%
Senior management ¹	13	121	134	10%	90%
Middle management	57	329	386	15%	85%
All other employees	1,419	8,549	9,968	14%	86%
Grand total	1,491	9,005	10,496	14%	86%
Directors of subsidiaries included in consolidation ²	39	402	441	9%	91%

Notes:

1. Of these 134 senior managers, 48 directly report to members of the Group Executive Committee and, of these, five are women (10%).
2. There are 441 directors of Group subsidiaries, 9% of whom are women. This disclosure is made to comply with regulatory requirements. It includes directors of dormant companies. Some individuals hold multiple directorships.

Nomination Committee continued

Board evaluation

The Board carries out an evaluation of its performance and that of its Committees every year. This year's evaluation was again externally facilitated by the corporate advisory firm, Lintstock. The Group subscribes to the use of Lintstock's Insider List database tool but has no other connection with the organisation and Lintstock does not have any connection with any of the Directors.

Each evaluation was conducted via a series of targeted questionnaires. As with previous years, the evaluation not only covered the performance of the Board but also that of its Committees, along with individual reviews of each Director and analysis of the performance of the Chairman. Narrative reports were then prepared for the Board and the Audit, Nomination and Remuneration Committees and a Partner from Lintstock attended the December Board meeting to present their findings.

The Board assessment focused on six different areas: Board composition, oversight of stakeholders and markets, Board dynamics, Board support and focus of meetings, Board oversight and risk management, and priorities for change, covering an array of topics in line with new governance requirements.

Overall, the Board was seen to operate effectively, with positive improvement since the last evaluation. Meetings were considered to be well run by the Chairman, with appropriate support from the Company Secretary, and timely receipt of clear and accurate Board papers. The Board's understanding of investors was rated highly, as was its understanding of the views of customers and employees, although it was recognised that there was scope to further improve the Board's information on customers' views. The Board's monitoring of culture and behaviours was positively rated, as were the Group's people

and talent development processes. The Group's strategy was noted to be clearly defined, but there continued to be a need to ensure that there was sufficient focus on reviewing its implementation of the Board agenda. It was felt that going forward the Board could strive to spend more time on broader stakeholder and strategic issues. The greater level of engagement by the Non-executive Directors with the business outside the boardroom was positively noted. Succession planning continued to be an area of focus, reflecting a significant number of senior management changes during 2018 and 2019. It was agreed that following these changes succession plans for the Chief Executive, Chief Financial Officer and other members of the Group Executive Committee would need to be reassessed in 2020. The responses on Board composition were noted by the Nomination Committee.

The individual assessment of Directors concluded that all of the Directors continued to contribute effectively, providing expert and strategic advice as appropriate and holding management to account in an open and constructive manner. They were considered to devote adequate time to their duties and to be engaged and proactive in debate at all meetings. The Chairman was viewed to operate with objective judgement, and his approach to chairing meetings was deemed to be inclusive and to facilitate debate. Each of the Committees was also considered to have operated effectively during the year.

As in previous years, a set of action points was compiled from the output of the evaluation to ensure that its findings are included in the Board's activities. These will be implemented by the Board in 2020, with progress reviewed by the Board throughout the year.

The 2018 evaluation identified the following Board priorities for future Board attention; these were addressed during 2019 as follows:

Area	Issue	Action taken in 2019
Strategy	New product development	Strategy presentations contained more focused content on technology and R&D, noting key launches planned and the pipeline of products for the future. Progress on R&D forms a key element of the Chief Executive's regular strategy update.
	Manufacturing footprint optimisation	Restructuring and lean plans expanded. Board and Audit Committee oversight retained throughout the year.
People and organisation	Senior management succession and talent development	Detailed focus on senior management succession and talent management at the Nomination Committee, with oversight of actions taken to refresh Group talent throughout the organisation.
	Continued focus on enhancing Board's understanding of senior management capabilities	Opportunities continued to be created for key senior management to present at Board meetings. Individual Non-executive Directors continued to undertake site visits in 2019, with specific measures implemented to ensure that these included meetings with high-potential executives, alongside other Group colleagues.
Risk and culture	Risk appetite	The Board implemented a comprehensive review of risk appetite.
Board performance	Continued focus on prioritising time for discussion of key strategic and operational issues at the Board meeting	Assisted by the clearer formatting and content of papers, the Board spent less time noting standard items for approval and more time debating key strategic and operational issues.
	Board information flow	The format of papers was amended to include clearer identification of action items and a concerted effort was made to ensure that they were more concise.

Senior management succession

The Committee's succession planning activities do not exclusively relate to the Board but encompass the senior management levels below the Board, aiming to support and encourage the growth of a pool of talent able to step up to the top roles in future years. A key area of focus for the Committee during 2019 was again on the Group's talent development and succession planning processes, with an emphasis on the development of the senior management cadre. The Committee considered detailed succession plans for the senior functional and business unit positions and was apprised of the work being undertaken to develop and recruit new executives for this talent pool. As part of the usual Board timetable, Directors also met key executives throughout the Group, at Board presentations and site visits, to gain a greater understanding of the breadth and depth of management talent. In addition, in order for the Committee to gain greater insight into the development of high-potential individuals in less senior positions, the standard protocol for Directors' site visits was amended during the year, to include a standing item for Non-executive Directors to meet with these high-potential individuals at each site.

Committee evaluation

The Committee's activities were part of the externally facilitated evaluation of Board effectiveness during the year, with Committee members completing individual questionnaires. The results of these written submissions were then collated and a written report tabled to the Committee. The management of Nomination Committee meetings was highly rated overall, and the greater involvement of the Committee in succession planning for senior management was seen as a positive development. Following a review of Committee requirements conducted at the beginning of the year, Committee members noted a marked improvement in the information provided to the Nomination Committee, particularly with regard to succession planning, talent development, management capabilities and business structure. The site visits conducted by the Chairman and Non-executives, with greater emphasis on meeting high-potential executives, were identified as having contributed effectively to the Committee's improved understanding of succession planning and talent development. Overall, the Committee was considered to have performed effectively over the past year. Going forward, it was noted that the Committee would continue to focus on reviewing the development of the pipeline of internal successors, and that other priorities for the Committee in 2020 included future Board rotation, noting that myself and Jane Hinkley would reach our ninth anniversaries, and Hock Goh and Douglas Hurt their sixth anniversaries, in 2021.

On behalf of the Nomination Committee

John McDonough CBE

Chairman, Nomination Committee

27 February 2020

Directors' Remuneration Report

Remuneration overview

Dear Shareholder,

On behalf of the Remuneration Committee, I am pleased to present the Directors' Remuneration Report for 2019. The Remuneration Report is split into two sections, a new Directors' Remuneration Policy and the Annual Report on Directors' Remuneration.

Further details of the new Remuneration Policy, which will be subject to a binding shareholder vote at the 2020 AGM, are given below. The Annual Report on Directors' Remuneration sets out details of the pay received by the Directors in 2019. It will be subject to an advisory shareholder vote at the 2020 AGM. All payments received by Directors in 2019 were in line with our Remuneration Policy.

Performance in 2019

2019 was a challenging year for the Group, during which we experienced declines in end-markets for both our Steel and Foundry Divisions. Despite these challenges, the Group focused swift action on restructuring and cost control as well as continuing to invest in technology. Our reported results declined from the high of 2018, registering £1,710.4m of sales and £181.4m of trading profit on a reported basis. Group return on sales was 10.6% compared with 11.0% in 2018.

2019 Directors' Remuneration

In 2019, Patrick André received a salary increase of 14%, the details of which are contained on page 118 of the Directors' Remuneration Report. This was disclosed in last year's Directors' Remuneration Report. There was no change to Guy Young's salary for 2019. With respect to variable incentives, in accordance with prior years, Patrick André and Guy Young received allocations of Performance Shares worth 200% and 150% of their base salaries respectively in 2019, and Annual Incentive awards with potential maximums of 125% of base salary. Other than as outlined above, the Remuneration Committee did not exercise any further discretion in respect of the award of Executive Directors' remuneration in 2019.

Remuneration outcomes for 2019

In 2019, the Annual Incentive awards were based 60% on Group headline earnings per share (EPS), 20% on the Group's working capital to sales ratio (based on the 12-month moving average) and 20% on specified personal objectives. 33% of any Annual Incentive earned will be deferred into awards over shares for three years.

In 2019, our adjusted headline EPS of 45.2 pence was below the threshold Annual Incentive target of 52.2 pence and the Group's 2019 working capital to sales ratio of 24.0% was above the threshold target of 23.5%. As a result, no payments are due to

the Executive Directors in respect of the financial performance metrics of the 2019 Annual Incentive. Payouts are due, however, in respect of the personal objectives element of the Annual Incentive, with the Committee awarding Patrick André and Guy Young 13.96% and 18.16% respectively of their maximum entitlements of 25% of base salary (being 20% of their overall Annual Incentive), in respect of the personal objectives they were set for 2019. The Committee considered the appropriateness of paying Directors' incentives under the personal objectives element of the Annual Incentive for 2019 when neither of the financial targets had been met. Given that the personal objectives are linked to key strategic, organisational and operational projects with measurable targets, the Committee concluded that such payouts were in order.

The performance period for the awards made under the Vesuvius Share Plan (VSP) in 2017 matured at the end of December 2019. Performance was measured equally by reference to total shareholder return (TSR) relative to the FTSE 250 (excluding investment trusts) and headline EPS growth over the three-year period (adjusted as above). Relative TSR performance was between median and upper quintile; as a result, 12.64% of Performance Share awards will vest under the TSR element (out of a maximum 50%). The annual compound headline EPS growth for the period was 15%, meeting the maximum headline EPS growth target of 15%. As a result, 50% of Performance Share awards will vest under the EPS performance element (out of a maximum of 50%).

The Committee considered whether to exercise its discretion when confirming the vesting of the Performance Shares, and reviewed the underlying financial performance of the Company to satisfy itself that the outcome was justified. Awards will vest in March 2020.

The Committee considered that the Group's Executive Remuneration Policy had operated appropriately in respect of 2019. The non-attainment of the financial performance elements of the Annual Incentive Plan reflected the decline in the Group's profitability for the year and the achievement of the performance targets for the VSP reflected the significant improvement in the Group's profitability over the past three years.

Workforce remuneration

The Remuneration Committee has always had clear oversight of the level and structure of remuneration for members of the Group Executive Committee, along with approving the structure and payment of awards to all executives under the Group's executive share plans. In addition, it has been provided with broad remuneration information on the top cadre of management. Following the recent revisions to the Code, the remit of the Remuneration Committee has been broadened to include the review of workforce remuneration and related policies and the more general alignment of incentives and rewards with culture. Given the diverse nature of the Group's operations both geographically and functionally, the Group has a wide variety of different remuneration and incentive arrangements in operation. The Committee has therefore agreed a programme for the review

Remuneration 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
Annual Incentive Plan	✓	✓	✓	✓	✓	✓	✓
Vesuvius Share Plan	✓	✓					

of workforce remuneration which commenced this year with a summary of the pension arrangements in the Group's largest territories and a review of the annual bonus arrangements applicable to the Top 150 executives. The Committee took the insights gained from this exercise into account when setting the policy for Executive Director remuneration.

Environmental, social and governance issues

The Committee recognises the need to consider environmental, social and governance matters in relation to Executive Directors' remuneration. The Executive Directors' personal objectives for the 2020 Annual Incentive contain specific targets in relation to such matters.

In addition, the malus and clawback provisions applicable to the Vesuvius Share Plan specifically contemplate the reduction of awards should an individual's conduct, a material failure of risk management or a serious breach of health and safety, result in serious reputational damage.

Review of Remuneration Policy and implementation in 2020

During the year, the Committee undertook a thorough review of the Directors' Remuneration Policy to ensure that it continues to support delivery of our business strategy. The Committee considered recent developments in governance and the views of our shareholders gained through our investor engagement programme. It also received independent advice from the Committee adviser, Deloitte, and reviewed the pay and benefits received by other Vesuvius employees. The Committee considered the market competitiveness of Vesuvius' reward package to ensure that the Group can continue to attract, motivate and retain appropriate talent to implement our business strategy successfully. As part of the process, the Committee sought, and received, the views of the Executive Directors and senior HR management on updates to the existing Policy.

However, whilst the Chief Executive (CEO) was rightly part of the development process and attended some meetings at which amendments to the existing Policy were discussed, he was not involved in the decision-making process. The Committee also consulted our major shareholders and the investment industry bodies (ISS, the Investment Association and Glass Lewis) on the proposed new policy.

Following these deliberations, the Remuneration Committee concluded that the remuneration framework in our current Policy remains consistent with our core strategic objective of delivering long-term sustainable and profitable growth and supports our performance-orientated culture. In particular, the Committee concluded that the existing combination of fixed pay, Annual Incentive and Long-Term Incentive awarded in Performance Shares remains the most suitable mechanism for rewarding and incentivising Executive Directors, focusing the Executive Directors on both proximate performance and longer-term goals. The existing 2017 Policy framework was therefore considered 'fit for purpose' and, as a result, no fundamental changes are proposed in the new Policy. We are, however, proposing some changes to respond to market and governance developments.

Enhancement of shareholding guidelines

- > The shareholding guideline that applies whilst in employment will be 200% of salary for all Executive Directors. To date, a lower guideline of 100% of salary has applied to Executive Directors other than the CEO.

- > A post-employment shareholding guideline will be introduced under which Executive Directors will remain subject to their shareholding requirement in the first year after their cessation as an Executive Director and to 50% of the shares retained in the first year during the second year after such cessation, recognising that there is no requirement to purchase additional shares if the shares held when they cease to be an Executive Director are less than the applicable shareholding guideline.

Aligning pension provision

- > As required by the new UK Corporate Governance Code, the level of pension allowance for Executive Directors appointed following the adoption of the 2020 Remuneration Policy will be aligned with the post-retirement benefits applicable to the majority of the workforce or, where appropriate, to the majority of the workforce of the relevant geography.
- > Our incumbent Directors currently receive a 25% pension contribution. This will be frozen at the 1 January 2020 amount and reduced over time such that by the end of 2022 it will be reduced to that of the majority of the workforce. The precise timing and quantum of the reductions will be finalised and disclosed in the Remuneration Report following the completion of a Group-wide review of pension arrangements.

Other changes

- > Under the existing Policy, whilst individuals' performance is reviewed annually, changes to base salaries and Non-executive Director fees were normally appraised over a two to three-year period with a consequence that individual increases, when paid, are usually in excess of those for the wider population of employees for that year. To align with standard market practice and provide greater uniformity between Director and employee annual salary reviews, it is proposed that we revert to a process of annual salary/fee reviews in the new Policy.
- > In order to give the Committee flexibility during the three-year Policy period, it is also proposed to increase the maximum Annual Incentive opportunity that can be offered under the Policy to Executive Directors from 125% to 150% of salary. As a Committee, we are mindful of the importance of using this flexibility in a responsible manner and can confirm that the Annual Incentive opportunity for the Executive Directors in 2020 will be unchanged at 125% of salary.
- > The Policy clarifies the flexibility to use different financial performance measures for different Vesuvius Share Plan award cycles in order to ensure that awards are aligned with strategic objectives, along with clarifying the flexibility available to the Committee when determining the Annual Incentive award of a Good Leaver.
- > In 2019, a two-year holding period post the three-year performance period was introduced for Vesuvius Share Plan awards to Executive Directors, taking the total release period for awards to five years. The two-year holding period will be formally adopted within the new Policy.
- > If appropriate, non-executive Directors may be paid an additional fee for membership of a Board Committee or other roles that involve significant additional time commitment and/or responsibility.

The Policy has been updated to reflect the additional reporting requirements of The Companies (Miscellaneous Reporting) Regulations 2018 and The Companies (Directors' Remuneration Policy and Directors' Remuneration Report) Regulations 2019.

Summary of new 2020 Remuneration Policy

The table below summarises our proposed new Policy and its proposed implementation in 2020.

	Terms of existing Policy	Changes in proposed new Policy	Proposed implementation of new Policy in 2020
Base salary	The individual's performance is reviewed annually with changes to base salary normally appraised over a two to three-year period. Individual increases when paid are likely to be in excess of those for the wider population of employees for that year	Base salary will normally be reviewed annually, with changes effective from 1 January	Salaries will be reviewed under the new policy effective 1 January 2021 2019 salaries are CEO £600,000; CFO £350,000 2020 salaries are CEO £618,000; CFO £385,000
Pension	Maximum provision of 30% of salary	Maximum provision for incumbent Directors of 25% of base salary. Incumbent Directors' provision will be frozen at the 1 January 2020 level and reduced over time to be aligned with that applicable to the majority of the workforce by the end of 2022 Maximum provision for future Director appointments to be aligned with the post-retirement benefits applicable to the majority of the workforce or, where appropriate, to the majority of the workforce of the relevant geography	Incumbent CEO and CFO – 25% of salary frozen at 1 January 2020 amount Any future Director appointment will receive pension provision in line with the new Policy
Annual Incentive	Maximum potential: 125% of salary 33% delivered in shares deferred for three years Majority based on Group financial measures; remainder based on financial, strategic or operational measures appropriate to the individual	Increased maximum potential of 150% of salary	Maximum potential: 125% of salary 60% based on EPS; 20% based on working capital to sales ratio; 20% based on personal objectives 33% delivered in shares deferred for three years
Vesuvius Share Plan	Annual awards of performance shares worth up to 200% of salary Awards vest three years after grant with Remuneration Committee discretion to impose an additional holding period Awards usually vest subject to EPS and relative TSR measures	Vested awards to be subject to two-year holding period Flexibility to include additional or alternative performance conditions for each award which are aligned to corporate strategy	200% of salary award to CEO; 150% of salary to CFO Awards released five years post grant (three-year performance period plus two-year holding period) Awards 50% based on TSR relative to FTSE 250 excluding Investment Trusts and 50% based on EPS growth
Shareholding guideline (whilst in employment)	Guideline of 200% of salary for CEO and 100% of salary for other Directors	Guideline of 200% of salary for all Executive Directors	Guideline of 200% of salary for all Executive Directors
Shareholding guideline (post-employment)	n/a	Executive Directors will remain subject to the in-employment Shareholding guideline in the first year after their cessation as an Executive Director and to 50% of the shares retained in the first year during the second year after such cessation, recognising that there is no requirement to purchase additional shares if the shares held when they cease to be an Executive Director are less than the applicable shareholding guideline	Executive Directors to remain subject to the in-employment Shareholding guideline in first year post their cessation as an Executive Director, reducing to 50% of the shares retained in the first year during the second year after such cessation

No other material changes to the existing Policy are being proposed.

The Committee is satisfied that the Remuneration Policy is designed to promote the long-term success of the Company, and accords with the requirements of the Code with regard to:

Clarity: There is complete transparency on the executive remuneration arrangements with full disclosure in the Annual Report. The Annual Incentive bonus structure for the Executive Directors is based on the same structure utilised for annual bonus arrangements for senior executives throughout the Group. The focus of incentive arrangements on long-term sustainable growth clearly aligns the interests of executives with those of the Group's shareholders. The Vesuvius Share Plan, with its emphasis on the retention of shares for a period of at least five years, clearly aligns the long-term objectives of the Directors with that of its investors.

Simplicity: The new Policy with its focus on three core elements: fixed pay, Annual Incentive and Long-Term Incentive is clear, simple and easy to understand.

Risk: The Committee has carefully analysed the range of possible outcomes of awards and believes the Policy to be fair and proportionate, with the clear linkage to Group profitability mitigating the potential for excessive rewards and the reliance on audited profit numbers and externally verified TSR targets serving to mitigate behavioural risk. The Committee has discretion under the Vesuvius Share Plan to determine the vesting of awards in accordance with the Code requirement and malus and clawback provisions also apply.

Predictability: The charts on page 109 provide estimates of the total remuneration for the Executive Directors for 2020 for minimum, on-target and maximum performance, showing the split between fixed and variable remuneration. The charts also indicate the maximum potential remuneration assuming 50% share price appreciation. Prior to any vesting under the Vesuvius Share Plan the Committee reviews the underlying financial performance of the Company over the performance period, and the non-financial performance of the Group and participants, to ensure that the vesting is justified. Following this review, the Committee has the discretion to amend the final vesting level if it does not consider that it is justified.

Proportionality: The Committee believes that the performance-related elements of remuneration have financial targets which are transparent, stretching and clearly align the Executive Directors' remuneration with the delivery of the Group's strategy. The Vesuvius Share Plan rewards long-term performance directly linked with the Group's strategy and results, ensuring that only strong performance is rewarded.

Alignment to culture: The Executive Directors' incentive arrangements are consistent with the Group's core strategic objective of delivering long-term sustainable and profitable growth and support our performance-orientated culture. The inclusion of personal objectives in the Annual Incentive Plan affords the opportunity for attention to be focused on key non-financial strategic objectives each year.

2020 salary review

In December 2019, the Committee reviewed Patrick André's and Guy Young's salaries. Under the terms of his appointment, Patrick André is entitled to an annual review. Guy Young's salary was reviewed under the terms of the current policy, having not received an adjustment since 1 January 2018. After reviewing the performance of both Directors, the Committee concluded that it was appropriate to increase Patrick André's salary by 3% to £618,000 in line with the UK workforce and Guy Young's salary by 10% to £385,000. Whilst Guy Young's increase (equivalent to 4.9%

p.a. for the two-year period since his last salary review) is higher than the average annual salary increase given to our UK staff over the equivalent period of 3.5% p.a., the Committee considered this was appropriate given his performance and continued development in his role.

2020 Vesuvius Share Plan awards

When the Committee met earlier this month, it was concerned that the current share price volatility could result in the 2020 Vesuvius Share Plan awards being made at an artificially low price. As a consequence, the Committee resolved that, whilst awards under the Vesuvius Share Plan will be made on the usual basis (using the middle market price for a Vesuvius share for the five days prior to the date of grant), the number of shares to be awarded will be capped at a level that reflects the middle market share price of the Company for the five days up to the Committee meeting, being 437.1 pence.

Employee and shareholder engagement

The Group's operations are geographically diverse in nature. The Group does not operate a central workforce engagement mechanism, and as such the Committee has not engaged systematically with the workforce during the year to explain how executive remuneration aligns with wider Company pay policy, although direct visits to operations by the Non-executive Directors have provided an open forum for discussion with employees. Copies of the Company's Annual Report detailing the Executive Directors' remuneration are, however, widely disseminated throughout the Group and available for employees to view on the Company's website.

At the 2019 AGM, all the resolutions were passed with the requisite majority, but 23% of votes were cast against the resolution relating to the approval of the Directors' Remuneration Report. Whilst a clear majority of shareholders were supportive of the resolution, three of the Company's larger shareholders, representing 22.67% of the Company's issued share capital, voted against the resolution. The Committee invited a dialogue with these shareholders and spoke with two of them.

The Committee ascertained that these two investors' concerns principally related to the level of salary increase awarded to the Chief Executive for 2019. The Committee and the Board discussed these concerns. The Company's rationale for its approach to this matter was set out in detail in the Directors' Remuneration Report in the 2018 Annual Report and was discussed further in the aforementioned shareholder meetings. The Committee and the Board continue to believe that the salary increase for the Chief Executive, which was supported by the majority of the shareholders, was appropriate. I separately wrote to each of the Company's largest shareholders and key governance agencies outlining the Committee's proposals for the 2020 Remuneration Policy and inviting comments. Vesuvius received responses from each governance agency contacted and from half of these shareholders. We entered into dialogue with a number of shareholders and the overall response has been supportive, both of the developments in the 2020 Remuneration Policy and to the changes proposed to Executive Directors' remuneration. I remain keen to hear shareholders' views on remuneration matters – including any further comments on our 2020 Remuneration Policy.

Yours sincerely

Jane Hinkley
Chairman, Remuneration Committee
27 February 2020

Directors' Remuneration Report

2020 Remuneration Policy

The Company is required to submit its Remuneration Policy to a binding shareholder vote at least every three years, and as the Policy was last approved at the AGM in 2017, a new Policy will be tabled for approval at the 2020 AGM, to take effect from the close of the 2020 AGM. The previous policy will apply in its entirety up until this date and after this date those elements of the previous policy that relate to remuneration that remain extant on this date (such as outstanding share awards) will continue to apply until these commitments cease.

The Remuneration Committee reserves the right to make any remuneration payments and payments for loss of office (including exercising any discretions available to it in connection with such payments), notwithstanding that they are not in line with the Policy set out here, where the terms of the payment were agreed: (i) before the date the Company's first Remuneration Policy approved by shareholders in accordance with Section 439A of the Companies Act came into effect; (ii) before the Policy set out here came into effect, provided that the terms of the payment were consistent with the shareholder-approved Remuneration Policy in force at the time they were agreed; or (iii) at a time when the relevant individual was not a Director of the Company and, in the opinion of the Remuneration Committee, the payment was not in consideration for the individual becoming a Director of the Company. For these purposes, 'payments' includes the Remuneration Committee satisfying awards of variable remuneration and, in relation to an award over shares, the terms of the payment are 'agreed' at the time the award is granted.

Remuneration Policy Table for Executive Directors

Base salary		
Alignment/purpose Helps to recruit and retain key employees. Reflects the individual's experience, role and contribution within the Company.	Opportunity Salary increases will normally be in line with the average increase awarded to other employees in the Group although increases may be made above this level at the Committee's discretion in appropriate circumstances. In considering any increase in base salary, the Committee will also take into account: <ul style="list-style-type: none"> (i) the role and value of the individual (ii) changes in job scope or responsibility (iii) progression in the role (e.g. for a new appointee) 	<ul style="list-style-type: none"> (iv) a significant increase in the scale of role and/or size, value or complexity of the Group and (v) the need to maintain market competitiveness No absolute maximum has been set for Executive Director base salaries. Current Executive Directors' salaries are set out in the Annual Report on Directors' Remuneration section of this Remuneration Report.
Operation Base salary is normally reviewed annually, with changes effective from 1 January. Base salary is positioned to be market competitive when considered against other global industrial companies, and relevant international and FTSE 250 companies (excluding Investment Trusts). Paid in cash, subject to local tax and social security regulations.		Performance Any increase will take into account the individual's performance, contribution and increasing experience.
Other benefits		
Alignment/purpose Provides normal market practice benefits.	expense reimbursement (including costs if a spouse accompanies an Executive Director on Vesuvius business), together with relocation allowances and expatriate benefits, in some instances grossed up for tax, in accordance with the Group's policies, and participation in any employee share scheme operated by the Group.	Opportunity There is no formal maximum as benefit costs can fluctuate depending on changes in provider, cost and individual circumstances.
Operation A range of benefits including, but not limited to: car allowance, private medical care (including spouse and dependent children), life insurance, disability and health insurance,		Performance None.
Pension		
Alignment/purpose Helps to recruit and retain key employees. Ensures income in retirement.	Opportunity Maximum of 25% of base salary for incumbent Executive Directors at the date that this policy is adopted. This will be frozen at the 1 January 2020 amount and reduced over time such that by the end of 2022 it will be reduced to the level applicable to the majority of the workforce.	The level of allowance for Executive Directors appointed following the adoption of this policy will be aligned with the post-retirement benefits applicable to the majority of the workforce or, where appropriate, to the majority of the workforce of the relevant geography.
Operation An allowance is given as a percentage of base salary. This may be used to participate in Vesuvius' pension arrangements, invested in own pension arrangements or taken as a cash supplement (or any combination of the above options).		Performance None.

Annual Incentive

Alignment/purpose

Incentivises Executive Directors to achieve key short-term financial and strategic targets of the Group.

Additional alignment with shareholders' interests through the operation of bonus deferral.

Operation

Normally 33% of any Annual Incentive earned by Executive Directors will be deferred into awards over shares under the Vesuvius Deferred Share Bonus Plan which normally vest after at least three years, other than in specified circumstances outlined elsewhere in this Policy. These may be cash or share settled.

The Committee has the discretion to determine that actual incentive payments should be lower than levels calculated by reference to achievement against targets if it considers this to be appropriate.

The Committee has the discretion to award participants the equivalent value of dividends accrued during the vesting period on any shares that vest.

Subject to malus and clawback.

Opportunity

Below threshold: 0%.

On-target: 50% of the applicable maximum opportunity in any year.

Maximum: Up to 150% of base salary.

The Remuneration Committee will set the level of maximum bonus opportunity for each Executive Director at the start of each year, with 50% of the applicable maximum payable for on-target performance.

Payments start to accrue on meeting the threshold level of performance, with payments between threshold and on-target and between on-target and maximum made on a pro rata basis.

Performance

The Annual Incentive is measured on targets set at the beginning of each year. The Committee establishes threshold and maximum performance targets for each financial year. The majority of the Annual Incentive will be determined by measure(s) of Group financial performance. The remainder of the Annual Incentive will be based on financial, strategic or operational measures appropriate to the individual Director. Performance is measured over a one-year period. Actual performance targets will be disclosed after the performance period has ended. They are not disclosed in advance due to their commercial sensitivity.

Vesuvius Share Plan (VSP)

Alignment/purpose

Aligns Executive Directors' interests with those of shareholders through the delivery of shares. Rewards Executive Directors for achieving the strategic objectives of growth in shareholder value and earnings.

Assists retention of Executive Directors over a three-year performance period.

Operation

VSP awards to Executive Directors are granted as Performance Share awards. These may be cash or share settled.

Awards vest three years after their award date, other than in specified circumstances outlined elsewhere in this Policy, subject to the achievement of specified conditions. All vested shares, net of any tax liabilities, are then subject to a further two-year holding period after the vesting date, which will continue to apply notwithstanding the termination of employment of the participants during this holding period, except at the Committee's discretion in exceptional circumstances, including a change of control or where the participant dies or has left employment due to ill health, injury or disability.

The Committee has the discretion to award participants the equivalent value of dividends accrued during the vesting period and further two year holding period on any shares that vest.

Subject to malus and clawback.

Opportunity

Executive Directors are eligible to receive an annual award with a face value of up to 200% of base salary in Performance Share awards.

Vesting at threshold performance is at 25% of the award, rising to vesting of the full award at maximum.

Performance

Vesting will be subject to performance conditions as determined by the Remuneration Committee ahead of each award. Those conditions will be disclosed in the Annual Report on Directors' Remuneration section of the Remuneration Report. The performance conditions will initially be Group EPS and relative TSR, although the Remuneration Committee will retain discretion for future awards to include additional or alternative performance conditions which are aligned with the corporate strategy.

At its discretion, the Committee may elect to add additional underpinning performance conditions.

The Company reserves the right only to disclose certain of the performance targets after the performance period has ended, due to their commercial sensitivity.

Prior to any vesting, the Remuneration Committee reviews the underlying financial performance of the Group over the performance period, and the non-financial performance of the Group and participants, to ensure that the vesting is justified. Following this review, the Committee has the discretion to amend the final vesting level if it does not consider that it is justified.

2020 Remuneration Policy continued

Malus/clawback arrangements

The Executive Directors' variable remuneration is subject to malus and clawback provisions. These provide the Committee with the flexibility, if required, to withhold or recover payments made to Executive Directors under the Annual Incentive Plan (including deferred awards) and/or to withhold or recover share awards granted to Executive Directors under the Vesuvius Share Plan, including any dividends granted on such awards. The circumstances in which the Committee could potentially elect to apply malus and clawback provisions include: a material misstatement in the Group's financial results; an error in the calculation of the extent of payment or vesting of an incentive; gross misconduct by an individual; or significant financial loss or serious reputational damage to Vesuvius plc resulting from an individual's conduct, a material failure of risk management or a serious breach of health and safety. These malus and clawback provisions apply for a period of up to three years after the end of a performance period (or end of the deferral period in respect of awards made under the Vesuvius Deferred Share Bonus Plan).

Performance measures

In selecting performance measures for the Annual Incentive, the Committee seeks to reflect key strategic aims and the need for a rigorous focus on financial performance. Each year, the Committee agrees challenging targets to ensure that underperformance is not rewarded. The Company will not be disclosing the specific financial or personal objectives set until after the relevant performance period has ended because of commercial sensitivities. The personal objectives are all job-specific in nature and track performance against key strategic, organisational and operational goals.

In selecting performance measures for the Vesuvius Share Plan, the Committee seeks to focus Executive Directors on the execution of long-term strategy and also align their rewards with value created for shareholders. On this basis, the performance conditions for the Vesuvius Performance Share awards will initially include measures based on TSR and EPS performance.

Within the Policy period, the Committee will continually review the performance measures used to ensure that awards are made on the basis of challenging targets that clearly support the achievement of the Group's strategic aims.

The Committee may vary or waive any performance condition(s) if circumstances occur which cause it to determine that the original condition(s) have ceased to be appropriate, provided that any such variation or waiver is fair, reasonable and not materially less difficult to satisfy than the original condition (in its opinion). In the event that the Committee were to make an adjustment of this sort, a full explanation would be provided in the next Remuneration Report.

The Committee may: (a) in the event of a variation of the Company's share capital, demerger, special dividend or any other corporate event which it reasonably determines justifies such an adjustment, adjust; and (b) amend the terms of awards granted under the share schemes referred to above in accordance with the rules of the relevant plans.

Share awards may be settled by the issue of new shares or by the transfer of existing shares. In line with prevailing best practice at the time this Policy was approved, any issuance of new shares is limited to 5% of share capital over a rolling ten-year period in relation to discretionary employee share schemes and 10% of share capital over a rolling ten-year period in relation to all employee share schemes.

Illustration of the application of the Remuneration Policy for 2020

The charts below show the total remuneration for Executive Directors for 2020 for minimum, on-target and maximum performance. The fixed elements of remuneration comprise base salary, pension and other benefits, using 2020 salary data. The assumptions on which they are calculated are as follows:

Minimum: Fixed remuneration only.

On-target: Fixed remuneration plus on-target Annual Incentive (made at 62.5% of base salary for Patrick André and Guy Young) and threshold vesting (i.e. median performance for TSR and threshold for EPS) for Performance Share awards (made at 200% of base salary for Patrick André and 150% of base salary for Guy Young) under the Vesuvius Share Plan. No share price appreciation is assumed.

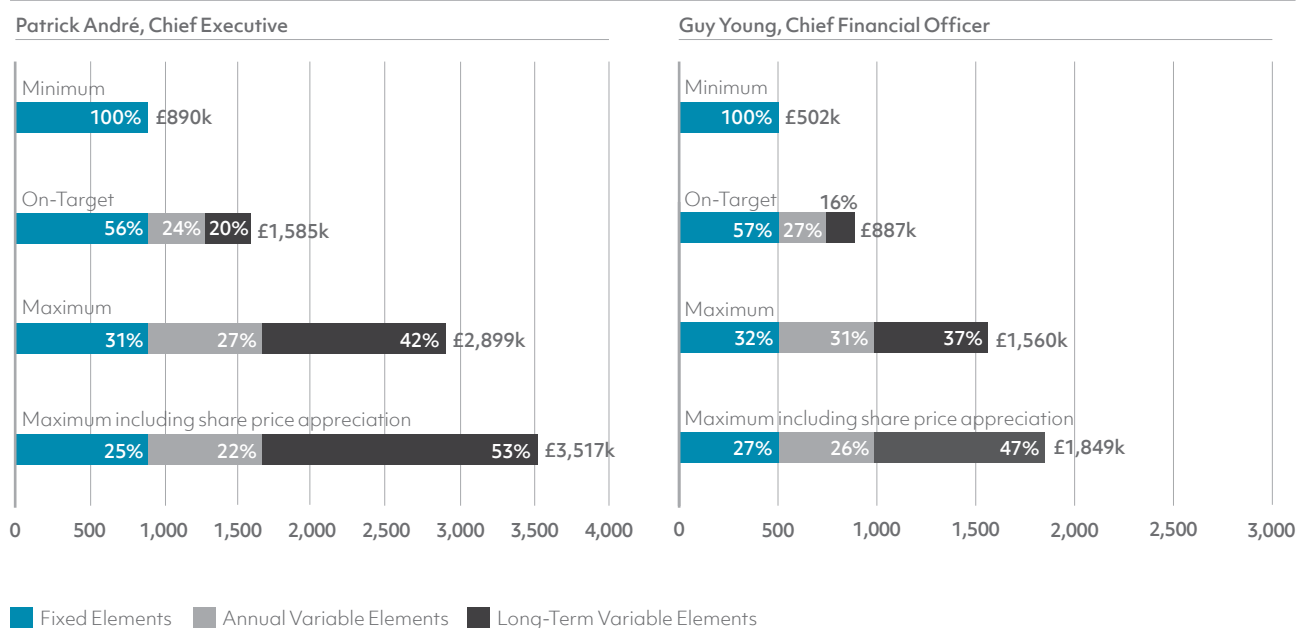
Maximum: Fixed remuneration plus maximum Annual Incentive (being full achievement of financial and personal targets, made at 125% of base salary for Patrick André and Guy Young) and 100% vesting for Performance Share awards (made at 200% of base salary for Patrick André and 150% of base salary for Guy Young) under the Vesuvius Share Plan. No share price appreciation is assumed.

Maximum including assumed 50% share price appreciation:

This shows the value of the maximum scenario if 50% share price appreciation is assumed over the three-year performance period of the Performance Share awards.

Note: In addition, the Committee retains the discretion to award dividends (either shares or their cash equivalent) on any shares that vest.

Remuneration Illustrations £000



Service contracts of Executive Directors

The Committee will periodically review the contractual terms for new Executive Directors to ensure that these reflect best practice. Service contracts currently operate on a rolling basis and are limited to a 12-month notice period.

Patrick André is employed as Chief Executive of Vesuvius plc pursuant to the terms of a service agreement made with Vesuvius plc dated 17 July 2017. Guy Young is employed as Chief Financial Officer pursuant to the terms of a service agreement with Vesuvius plc dated 16 September 2015. Each Executive Director's appointment is terminable by Vesuvius on not less than 12 months' written notice, and by each Executive Director on not less than six months' written notice.

External appointments of Executive Directors

The Executive Directors do not currently serve as Non-executive Directors of any other quoted company. Subject always to consent being granted by the Company for them to take up such an appointment, were they to so serve, the Company would allow them to retain any fees they received for the performance of their duties.

2020 Remuneration Policy continued

Remuneration Policy for Non-executive Directors

The Company seeks to appoint Non-executive Directors who have relevant professional knowledge and have gained experience in a relevant industry and geographical sector, to support diversity of expertise at the Board and match the wide geographical spread of the Company's activities.

Non-executive Directors attend Board, Committee and other meetings, held mainly in the UK, together with an annual strategy review to debate the Company's strategic direction. All Non-executive Directors are expected to familiarise themselves with the scale and scope of the Company's business and to maintain their specific technical skills and knowledge.

The Board sets the level of fees paid to the Non-executive Directors after considering the role and responsibilities of each Director and the practice of other companies of a similar size and international complexity. The Non-executive Directors do not participate in Board discussions on their own remuneration.

Fees

Alignment/purpose

To attract and retain Non-executive Directors of the necessary skill and experience by offering market-competitive fees.

Operation

Fees are usually reviewed every year by the Board.

Non-executive Directors are paid a base fee for the performance of their role plus additional fees for roles that involve significant additional time commitment and/or responsibility. Such roles could include, but

are not limited to, Committee chairmanship (and, where appropriate, membership) or acting as the Senior Independent Director. Fees are paid in cash.

The Chairman is paid a single cash fee and receives administrative support from the Company.

Opportunity

Non-executive Directors and the Chairman will be paid market-appropriate fees, with any increase reflecting changes in the market or adjustments to a specific Non-executive Director's role.

No eligibility for bonuses, retirement benefits or to participate in the Group's employee share plans.

Base fees paid to Non-executive Directors will in aggregate remain within the aggregate limit stated in our Articles, currently being £500,000.

Performance

None.

Benefits and expenses

Alignment/purpose

To facilitate execution of responsibilities and duties required by the role.

Operation

All Non-executive Directors are reimbursed for reasonable expenses incurred in carrying out their duties (including any personal tax owing on such expenses).

Opportunity

Non-executive Directors' expenses are paid in accordance with Vesuvius' expense procedures.

Performance

None.

Terms of service of the Chairman and other Non-executive Directors

The terms of service of the Chairman and the Non-executive Directors are contained in letters of appointment. Each Non-executive Director is appointed subject to their election at the Company's first Annual General Meeting following their appointment and re-election at subsequent Annual General Meetings. During the first year of his/her appointment, the Chairman is entitled to 12 months' notice from the Company; thereafter, he/she is entitled to six months' notice from the Company. None of the other Non-executive Directors is entitled to receive compensation for loss of office at any time. All Non-executive Directors are subject to retirement, and election or re-election, in accordance with the Company's Articles of Association. The current policy is for Non-executive Directors to serve on the Board for a maximum of nine years, with review at the end of three and six years, subject always to mutual agreement and annual performance evaluation. The Board retains discretion to extend the tenure of Non-executive Directors beyond this time, subject to the requirements of Board balance and independence being satisfied.

The table below shows the date of appointment for each of the Non-executive Directors:

Non-executive Director	Date of appointment
John McDonough CBE	31 October 2012
Friederike Helfer	4 December 2019
Hock Goh	2 April 2015
Jane Hinkley	3 December 2012
Douglas Hurt	2 April 2015
Holly Koepfel	3 April 2017

Recruitment policy

On appointment or promotion of a new Executive Director, the Committee will typically use the Remuneration Policy in force at the time of the Committee's decision to determine ongoing remuneration.

Base salary levels will generally be set in accordance with the Remuneration Policy current at the time of the Committee's decision, taking into account the experience and calibre of the appointee. If it is appropriate to appoint an individual on a base salary initially below what is adjudged to be market positioning, contingent on individual performance, the Committee retains the discretion to realign base salary over the one to three years following appointment, which may result in a higher rate of annualised increase than might otherwise be awarded under the Policy. If the Committee intends to rely on this discretion, it will be noted in the first Remuneration Report following an individual's appointment. Other than in exceptional circumstances, other elements of annual remuneration will, typically, be set in line with the Remuneration Policy, including a limit on awards under the Annual Incentive and Vesuvius Share Plan of 350% of salary in aggregate. The Committee retains the discretion to make the following further exceptions:

- > In the event that an internal appointment is made, or where a Director is appointed as a result of transfer into the Group on an acquisition of another Company, the Committee may continue with existing remuneration provisions for this individual, where appropriate
- > If necessary and appropriate to secure the appointment of a candidate who has to move locations as a result of the appointment, whether internal or external, the Committee may make additional payments linked to relocation, above those outlined in the policy table, and would authorise the payment of a relocation allowance and repatriation, as well as other associated international mobility terms. Such benefits would be set at a level which the Committee considers appropriate for the role and the individual's circumstances
- > If appropriate the Committee may apply different performance measures and/or targets to a Director's first incentive awards in his/her year of appointment

Service contracts will be entered into on terms similar to those for the existing Executive Directors, summarised in the service contracts of Executive Directors section above.

In addition to the annual remuneration elements noted above, the Committee may consider buying out terms, incentives and any other compensation arrangements forfeited on leaving a previous employer that an individual forfeits in accepting an appointment with Vesuvius. The Committee will have the authority to rely on Listing Rule 9.4.2R(2) or to apply the existing limits within the Vesuvius Share Plan to make Restricted Share awards on recruitment. In making any such awards, the Committee will review the terms of any forfeited awards, including, but not limited to, vesting periods, the expected value of such awards on vesting and the likelihood of the performance targets applicable to such awards being met, while retaining the discretion to make any buy-out award the Committee determines is necessary and appropriate. The Committee may also require the appointee to purchase shares in Vesuvius to a pre-agreed level prior to vesting of any such awards. The value of any buy-out award will be capped, to ensure its maximum value is no higher than the value of the awards that the individual forfeited on joining Vesuvius. Any such awards will be subject to malus and clawback.

With respect to the appointment of a new Chairman or Non-executive Director, appointment terms will be consistent with those applicable at the time the appointment is agreed. Variable pay will not be considered. With respect to Non-executive Directors, fees will be consistent with the Policy at the time the appointment is agreed. If, in exceptional circumstances, a Non-executive Director was asked to assume an interim executive role, the Company retains the discretion to pay them appropriate executive compensation, in line with the Policy.

Exit payment policy

Vesuvius has the option to make a payment in lieu of part or all of the required notice period for Executive Directors. Any such payment in lieu will consist of the base salary, pension contributions and value of benefits to which the Director would have been entitled for the duration of the remaining notice period, net of statutory deductions in each case. Half of any payments in lieu of notice would be made in a lump sum, the remainder in equal monthly instalments commencing in the month in which the midpoint of their foregone notice period falls (and are reduced or extinguished by salary from any role undertaken by the departing Executive in this time). Executive Directors are subject to certain non-compete covenants for a period of nine months, and non-solicitation covenants for a period of 12 months, following the termination of their employment. Their service agreements are governed by English law.

2020 Remuneration Policy continued

Executive Directors' contracts do not contain any change of control provisions; they do contain a duty to mitigate should the Director find an alternative paid occupation in any period during which the Company must otherwise pay compensation on early termination.

The table below summarises how the awards under the annual bonus and Vesuvius Share Plan are typically treated in different leaver scenarios and on a change of control.

Whilst the Committee retains overall discretion on determining 'good leaver' status, it typically defines a 'good leaver' in circumstances such as retirement with agreement of the Company, ill health, disability, death, redundancy, or part of the business in which the individual is employed or engaged ceasing to be part of the Group. Final treatment is subject to the Committee's discretion.

Event	Timing	Calculation of vesting/payment
Annual Incentive Plan – during period prior to payment		
Good leaver	Paid at the same time as to continuing employees.	Annual bonus is paid only to the extent that any performance conditions have been satisfied and is prorated for the proportion of the financial year worked before cessation of employment. In determining the level of bonus to be paid, the Committee may, at its discretion, take into account performance up to the date of cessation or over the financial year as a whole based on appropriate performance measures as determined by the Committee. The bonus may, at the Committee's discretion, be paid entirely in cash.
Bad leaver	Not applicable.	Individuals lose the right to their annual bonus.
Change of control	Paid on the effective date of change of control.	Annual bonus is paid only to the extent that any performance conditions have been satisfied and is prorated for the proportion of the financial year worked.
Annual Incentive Plan – in respect of any amount deferred into awards over shares under the Vesuvius Deferred Share Bonus Plan		
Good leaver	On the date of the event.	Deferred awards vest in full.
Bad leaver	On the date of the event.	Other than dismissal for cause, deferred awards will vest in full.
Change of control²	Within seven days of the event.	Deferred awards vest in full.
Vesuvius Share Plan		
Good leaver¹	On normal release date (or earlier at the Committee's discretion).	Unvested awards vest to the extent that any performance conditions have been satisfied and a pro rata reduction applies to the value of the awards to take into account the proportion of vesting period not served, unless the Committee decides that the reduction in the number of vested shares is inappropriate.
Bad leaver	Unvested awards lapse.	Unvested awards lapse on cessation of employment.
Change of control²	On the date of the event.	Unvested awards vest to the extent that any performance conditions have been satisfied and a pro rata reduction applies for the proportion of the vesting period not served, unless the Committee decides that the reduction in the number of vested shares is inappropriate.

Notes:

- Under the rules of the Vesuvius Share Plan, any vested shares, net of any tax liabilities, are subject to a further two-year holding period after the vesting date. The holding period may be terminated early at the Committee's discretion in exceptional circumstances, including a change of control or where the award holder dies or leaves employment due to ill health, injury or disability.
- In certain circumstances, the Committee may determine that unvested awards under the Vesuvius Deferred Bonus Plan and Vesuvius Share Plan will not vest on a change of control but will instead be replaced by an equivalent grant of a new award, as determined by the Committee, in the new company.

Benefits normally cease to be provided on the date employment ends. However, the Committee has the discretion to allow some minor benefits (such as health insurance, tax advice and repatriation expenses) to continue to be provided for a period following cessation where this is considered fair and reasonable, or appropriate on the basis of local market practice. In addition, the Committee retains discretion to fund other expenses for the Executive Director; for example, payments to meet legal fees incurred in connection with termination of employment, or to meet the costs of providing outplacement support, and de minimis termination costs up to £5,000 to cover transfer of mobile phone or other administrative expenses.

The Committee reserves the right to make any other payments in connection with a Director's cessation of office or employment where the payments are made in good faith in discharge of an existing legal obligation (or by way of damages for breach of such an obligation) or by way of a compromise or settlement of any claim arising in connection with the cessation of a Director's office or employment.

In certain circumstances, the Committee may approve new contractual arrangements with departing Executive Directors, including (but not limited to) settlement, confidentiality, restrictive

covenants and/or consultancy arrangements. These would be used only where the Committee believed it was in the best interests of the Company to do so.

Comparison of Remuneration Policy for Executive Directors with that for other employees

The Remuneration Policy for Executive Directors is designed in line with the remuneration philosophy set out in this report – which also underpins remuneration for the wider Group. Remuneration arrangements for Executive Directors draw on the same elements as those for other employees – base salary, fixed benefits and retirement benefits – with performance-related pay extending to the management cadres and beyond. However, given that remuneration structures for other employees need to reflect both seniority and local market practice, they differ from the policy for Executive Directors. In particular, Executive Directors receive a higher proportion of their remuneration in performance-related pay and share-based payments. Individual percentages of variable versus fixed remuneration and participation in share-based structures increase as seniority increases.

As for Executive Directors, all employees receive an annual performance appraisal, and receive salary reviews on an annual basis. Middle and senior managers participate in the Annual Incentive Plan. For functional members of the Group Executive Committee, the award is predominantly based on Group performance, with the remainder focused upon the achievement of personal objectives. For business unit Presidents and other operational business unit employees, any potential award is based upon four separate measures relating to Group performance, business unit performance, regional performance, where relevant, and achievement of personal objectives.

All members of the Group Executive Committee participate in the Vesuvius Share Plan and receive awards of Performance Shares, which vest on the basis of the same targets set for the Executive Directors. The level of awards granted to members of the Group Executive Committee who don't serve on the Board are lower than those payable to the Executive Directors.

For certain senior and middle managers, awards are made under the Vesuvius Medium Term Plan (MTP). These managers participate in the MTP at varying percentage levels, and awards are based on the same measures and targets as the Annual Incentive Plan. The senior management cadre receives MTP awards made over Vesuvius shares, whilst other managers who participate in the MTP receive their awards in cash. In each case, awards are granted following the end of the relevant financial year. The MTP share awards vest on the second anniversary of the date of grant, subject to continuing employment.

Consideration of conditions elsewhere in the Group in developing policy

The Company does not consult directly with employees on Executive Directors' remuneration arrangements. However, the Remuneration Committee will take into account the pay and employment conditions of other Group employees when determining Executive Directors' remuneration, particularly when determining base salary increases, when the Committee will consider the salary increases for other Group employees in the same jurisdiction.

Consideration of shareholder views

Vesuvius is committed to open and transparent dialogue with its shareholders on remuneration as well as other governance matters. As Chairman of the Committee, Jane Hinkley welcomes shareholder engagement and is available for any discussions investors wish to have on remuneration matters. During 2019, as with previous years, Jane Hinkley directly contacted significant shareholders to offer discussions on remuneration matters and a number of meetings were conducted by her, and the Board Chairman, accordingly. The feedback from such meetings is always shared with the Committee and taken into consideration when decisions are made about future remuneration strategy and arrangements. Two investors expressed concerns related to the level of salary increase awarded to the Chief Executive for 2019. The Remuneration Committee and the Board discussed these concerns. The Company's rationale for its approach to this matter was set out in detail in the Directors' Remuneration Report in the 2018 Annual Report and Financial Statements and was discussed further in the aforementioned shareholder meetings. The Committee and the Board continue to believe that the salary increase for the Chief Executive, which was supported by the majority of the shareholders, was appropriate. In early 2020, the Committee separately wrote to its largest shareholders and key governance agencies outlining its proposals for the 2020 Remuneration Policy and inviting comments. Vesuvius received responses from each governance agency contacted and from 53% of the shareholders, and entered into dialogue with a number of shareholders as a result. The overall shareholder response has been supportive both of the developments in the 2020 Remuneration Policy and of the changes proposed to executive remuneration. The development of practices in line with the new Policy will be carefully managed by the Committee.

Shareholding guidelines

The Remuneration Committee encourages Executive Directors to build and hold a shareholding in the Company equivalent in value to at least 200% of base salary.

Compliance with the shareholding policy is tested at the end of each year for application in the following year, with the valuation of any holding being taken at the higher of: (1) the share price on the date of vesting of any shares derived from a share award, in respect of those shares only; and (2) the average of the closing prices of a Vesuvius ordinary share for the trading days in that December.

Unless exceptionally the Committee determines otherwise, under the post-employment shareholding guideline the Executive Directors will remain subject to their shareholding requirement in the first year after their cessation as an Executive Director and to 50% of the shares retained in the first year during the second year after such cessation, recognising that there is no requirement to purchase additional shares if the shares held when they cease to be an Executive Director are less than the applicable shareholding guideline.

General

The Committee may make minor amendments to the policy set out in this Policy Report (for regulatory, exchange control, tax or administrative purposes or to take account of a change in legislation) without obtaining shareholder approval for that amendment.

Directors' Remuneration Report

Annual Report on Directors' Remuneration

Directors' Remuneration at a glance

Our remuneration for Executive Directors

The table below sets out the phasing of receipt of the various elements of Executive Director remuneration for 2020.

	2020	2021	2022	2023	2024	2025	Description and link to strategy
Base salary							Salaries are set at an appropriate level to enable the Company to recruit and retain key employees, and reflect the individual's experience, role and contribution within the Company.
Benefits							Provides normal market practice benefits.
Pension							The pension benefit helps to recruit and retain key employees and ensures income in retirement.
Annual Incentive							The Annual Incentive incentivises the Executive Directors to achieve key short-term financial and strategic targets of the Group.
Deferred Annual Incentive							The deferral of a portion of the Annual Incentive increases alignment with shareholders.
Vesuvius Share Plan							Awards under the Vesuvius Share Plan align Executive Directors' interests with those of shareholders through the delivery of shares and assist in the retention of the Executive Directors. The VSP rewards the Executive Directors for achieving the strategic objectives of growth in shareholder value and earnings.

2020 Directors' Remuneration

The table below sets out how the Remuneration Policy will be applied to the Executive Directors' remuneration for 2020. Further details about each of the elements of remuneration are set out in the Remuneration Policy and the Annual Report on Directors' Remuneration.

Remuneration element	Remuneration structure
Base salary	<p>Current salaries as follows:</p> <ul style="list-style-type: none"> > Patrick André – £618,000 (2019: £600,000) > Guy Young – £385,000 (2019: £350,000) <p>The 2020 salaries shown above include a salary increase effective from 1 January 2020 of 3% for Patrick André and 10% for Guy Young.</p>
Benefits	Benefits for Executive Directors include car allowance, private medical care, relocation expenses, tax advice and tax reimbursement, commuting costs, school fees, Directors' spouse's travel and administrative expenses.
Pension	Pension allowances of 25% of base salary. This allowance can be used to participate in Vesuvius' pension arrangements, be invested in their own pension arrangements or be taken as a cash supplement (or any combination of these alternatives). The pension allowance is frozen at the 1 January 2020 amount and will be reduced over time such that by the end of 2022 it will be reduced to the level applicable to the majority of the workforce.
Annual Incentive	For 2020 the maximum Annual Incentive potential for the Executive Directors will be 125% of base salary with target Annual Incentive potential being 62.5% of base salary. Their incentives are based 60% on Group headline earnings per share, 20% on the Group's working capital to sales ratio (based on the 12-month moving average) and 20% on specified personal objectives. 33% of any Annual Incentive earned will be deferred into awards over shares, to be held for a period of three years.
Vesuvius Share Plan	Performance Share awards with a maximum value of 200% of salary will be awarded to Patrick André and 150% for Guy Young. Vesting of 50% of shares awarded will be based upon the Company's TSR performance relative to that of the constituent companies of the FTSE 250 (excluding investment trusts), and 50% on headline EPS growth. Performance will be measured over three years with awards vesting after three years. There will then be a further two-year holding period applicable to the awards.

Remuneration Committee structure

The current members of the Remuneration Committee are all the independent Non-executive Directors of the Company.

The Committee Chairman is Jane Hinkley. Jane Hinkley, Hock Goh, Douglas Hurt and Holly Koepfel have all served on the Committee throughout 2019. All continue in office as at the date of this report. The Committee complies with the requirements of the UK Corporate Governance Code for the composition of remuneration committees. Each of the members brings a broad experience of international businesses and an understanding of their challenges to the work of the Committee. The Company Secretary is Secretary to the Committee. Members' biographies are on pages 76 and 77.

Meetings

The Committee met five times during the year. The Group's Chairman, Chief Executive and Chief HR Officer were invited to each meeting, together with Christer Gardell, Vesuvius' non-independent Non-executive Director, though none of them participated in discussions regarding their own remuneration. In addition, a representative from Deloitte, the Remuneration Committee adviser, attended the meetings. The attendees supported the work of the Committee, giving critical insight into the operational demands of the business and their application to the overall remuneration strategy within the Group. In receiving views on remuneration matters from the Executive Directors and senior management, the Committee recognised the potential for conflicts of interest to arise and considered the advice accordingly. The Chairman of the Committee reported the outcomes of all meetings to the Board.

The Committee operates under formal terms of reference which were reviewed during the year. The terms of reference are available on the Group website www.vesuvius.com. The Committee members are permitted to obtain outside legal advice at the Company's expense in relation to their deliberations. These powers were not exercised during the year. The Committee may also secure the attendance at its meetings of any employee or other parties it considers necessary.

Role and responsibilities

The Committee is responsible for:

- > Determining the overall remuneration policy for the Executive Directors, including the terms of their service agreements, pension rights and compensation payments
- > Setting the appropriate remuneration for the Chairman, the Executive Directors and Senior Management (being the Group Executive Committee)
- > Reviewing workforce remuneration and related policies, and the alignment of incentives and rewards with culture, taking these into account when setting the policy for Executive Director remuneration
- > Overseeing the operation of the executive share incentive plans

Advice provided to the Remuneration Committee

Deloitte is appointed directly by the Remuneration Committee to provide advice on executive remuneration matters, including remuneration structure and policy, updates on market practice and trends, and guidance on the implementation and operation of share incentive plans. The Committee appointed Deloitte, a signatory to the Remuneration Consultants Group Code of Conduct in relation to Executive Remuneration Consulting in the UK, following a formal tender process in 2014. Deloitte also provides the Remuneration Committee with ongoing calculations of total shareholder return (TSR) to enable the Committee to monitor the performance of long-term share incentive plans. Deloitte does not have any other connection with any individual Director.

In addition in 2019, Deloitte provided the Group with IFRS 2 calculations for the purposes of valuing the share plan grants and, within the wider Group, was engaged in various jurisdictions to provide tax and treasury advisory work, and some consultancy services. During 2019, Deloitte's fees for advice to the Remuneration Committee, charged on a time spent basis, amounted to £79,710. The Committee conducted a review of the performance of Deloitte as remuneration adviser during the year and concluded that Deloitte continued to provide effective, objective and independent advice to the Committee. No conflict of interest arises as a result of other services provided by Deloitte to the Group.

Activities of the Remuneration Committee

The key matters the Remuneration Committee considered during its five meetings in 2019 included:

- > Considering and approving the 2020 salaries for the Chairman, Chief Executive, Chief Financial Officer and senior management
- > Reviewing and approving achievement against performance targets for the 2018 Annual Incentive arrangements
- > Setting performance targets and approving the structure of the 2019 Annual Incentive arrangements
- > Reviewing and assessing the Company's attainment of performance conditions applicable to the Vesuvius Performance Share awards made in 2016
- > Setting the performance measures and targets, and authorising the grant of new awards in 2019 under the Vesuvius Share Plan, the Deferred Share Bonus Plan and Medium Term Incentive Plan
- > Considering the Company's ongoing share sourcing requirements to meet obligations under the Company's share plans, and funding of the employee share ownership plan (ESOP)
- > Considering, formulating and approving the 2020 Directors' Remuneration Policy, taking into account the requirements of the 2018 UK Corporate Governance Code, along with advice received from the external advisers and other trends in remuneration practice

Annual Report on Directors' Remuneration continued

- > Reviewing the Annual Incentive Plan structure applicable to the Group and approving changes to this structure for executives below the Board to incorporate a more granular level of trading performance at business unit level into the bonus plan structure
- > Approving the 2018 Directors' Remuneration Report and reviewing the 2019 Directors' Remuneration Report
- > Reviewing the Committee's terms of reference

As in previous years, the Committee was the subject of an externally moderated performance evaluation in 2019. The management of Remuneration Committee meetings was highly rated, with the meetings being seen to be well run, and the work being well prepared and organised. The quality of information provided to the Remuneration Committee from management and internal sources was positively rated, as was the quality of information and advice provided to the Remuneration Committee by the external remuneration adviser, Deloitte. The Committee noted that it had a good understanding of senior executive remuneration, but that there was more work to do for it to gain a deeper understanding of the remuneration of the workforce in general, a complex task given the number of countries and variables involved. The Committee also reflected on the process that had been undertaken for the revision of the Group's Remuneration Policy and concluded that it had worked effectively.

Regulatory compliance

The Remuneration Policy, which is set out on pages 106-113, was prepared in accordance with the Companies Act 2006 and the Large and Medium-sized Companies and Groups (Accounts and Reports) Regulations 2008 (as amended). It also meets the requirements of the Financial Conduct Authority's Listing Rules and the Disclosure Guidance and Transparency Rules.

This Remuneration Report sets out how the principles of the Code are applied by the Company in relation to matters of remuneration. We have complied for the year under review with the provisions of the Code.

Share usage

Under the rules of the Vesuvius Share Plan, the Company has the discretion to satisfy awards either by the transfer of Treasury shares or other existing shares, or by the allotment of newly issued shares. Awards made under the Deferred Share Bonus Plan to satisfy shares awarded to Directors in respect of their Annual Incentive, and awards made to management of the Company over shares pursuant to the Medium Term Incentive Plan, must be satisfied out of Vesuvius shares held for this purpose by the Company's ESOP trust.

The decision on how to satisfy awards is taken by the Remuneration Committee, which considers the most prudent and appropriate sourcing arrangement for the Company.

At 31 December 2019, the Company held 7,271,174 ordinary shares in Treasury and the ESOP held 1,718,615 ordinary shares. During the year, the trustee of the ESOP purchased an additional 71,544 Vesuvius plc shares to hold to satisfy the potential future vesting of awards under the Company's share incentive plans. The ESOP can be gifted Treasury shares by the Company, can purchase shares in the open market or can subscribe for newly issued shares, as required, to meet obligations to satisfy options and awards that vest.

The Vesuvius Share Plan complies with the current Investment Association guidelines on headroom which provide that overall dilution under all plans over a rolling ten-year period should not exceed 10% of the Company's issued share capital, with a further limitation over a rolling ten-year period of 5% for discretionary share schemes. More than 9.9% of the 10% limit and more than 4.9% of the 5% limit remains available as headroom for the issue of new shares or the transfer of Treasury shares for the Company. No Treasury shares have been transferred or newly issued shares allotted under the Vesuvius Share Plan during the year under review.

Policy implementation

The following section provides details of how the Company's current Remuneration Policy was implemented during the financial year 2019 and how it will be implemented in the financial year 2020.

Directors' Remuneration – audited

The table below sets out the total remuneration received by Executive Directors in the financial year under review:

	Patrick André		Guy Young	
	2019 (£000)	2018 (£000)	2019 (£000)	2018 (£000)
Total salary ¹	600	525	350	350
Taxable benefits ²	118	203	20	29
Pension ³	150	131	88	88
Total fixed pay⁴	868	859	458	467
Annual Incentive ⁵	84	546	64	351
Long-Term Incentives ^{6,7}	311	617	286	856
Total variable pay ⁸	395	1,163	350	1,207
Total⁹	1,263	2,022	808	1,674

The table below sets out the fees and taxable benefits received by Non-executive Directors in the financial year under review and the total remuneration received by both Executive and Non-executive Directors during the year under review:

	2019			2018		
	Total fees ¹ (£000)	Taxable benefits ² (£000)	Total (£000)	Total fees ¹ (£000)	Taxable benefits ² (£000)	Total (£000)
John McDonough CBE	205	11	216	185	7	192
Christer Gardell ¹⁰	47	3	50	45	8	53
Hock Goh	50	5	55	45	5	50
Friederike Helfer ¹¹	4	—	4	—	—	—
Jane Hinkley	65	3	68	60	3	63
Douglas Hurt	70	1	71	65	1	66
Holly Koepfel	50	8	58	45	6	51
Total 2019 Non-executive Director remuneration			522			
Total 2019 Executive Director remuneration			2,071			
Total 2019 Director remuneration			2,593			

Notes:

1. Base salary (or fees, as appropriate) earned in relation to services as a Director during the financial year.
2. The UK regulations require the inclusion of benefits for Directors where these would be taxable in the UK on the assumption that the Director is tax resident in the UK. The figures in the table therefore include expense reimbursement and associated tax relating to travel, accommodation and subsistence for the Director (and, where appropriate, their spouse) in connection with attendance at Board meetings and other corporate business during the year, which are considered by HMRC to be taxable in the UK. Standard benefits for the Executive Directors include car allowance and private medical care. As an expatriate, Patrick André also receives relocation benefits under Vesuvius' applicable expatriate localisation policy. As detailed in the 18 July 2017 RNS announcement of Mr André's appointment, those relocation benefits (totalling £89,796 in 2019) comprise commuting and housing costs, a one-off resettlement allowance of one month's salary (paid in 2018), tax advice and school fees.
3. Patrick André and Guy Young currently receive a pension allowance of 25% of base salary. The figures in the table represent the value of all cash allowances and contributions received in respect of pension benefits.
4. The sum of total salary, taxable benefits and pension.
5. This figure includes the Annual Incentive payments to be made to the Executive Directors in relation to the year under review. 33% of these Annual Incentive payments will be deferred into awards over shares, to be held for a period of three years. See pages 118 and 119 for more details.
6. The 2018 figures represent the Performance Share awards granted to Patrick André and Guy Young in 2016 under the Vesuvius Share Plan, that vested in 2019, along with the cash payment for the dividend that had accrued on these vested shares. See Note 2 of the Vesuvius Performance Share award allocations table on page 121 for further detail. Of these amounts, £383,391 was attributable to share price growth in respect of the vesting of Guy Young's shares and £276,202 in respect of Patrick André's shares.
7. The 2019 figures represent the Performance Share awards granted to Patrick André and Guy Young in 2017 under the Vesuvius Share Plan, that are due to vest in 2020. See Note 3 of the Vesuvius Performance Share awards allocations table on page 122. At an average Vesuvius mid-market closing share price (from 1 October 2019–31 December 2019) of 434.37 pence, the total value of the awards that are due to vest, along with the value of the dividends that have already accrued on these shares, is £596,915. None of this amount is attributable to share price growth as the shares were granted based on a share price higher than the assumed vesting price. The awards due to vest to Patrick André in September 2020 may also accrue further dividends prior to vesting.
8. The sum of the value of the Annual Incentive and the Long-Term Incentives where the performance period ended during the financial year.
9. The sum of base salary, benefits, pension, Annual Incentive and Long-Term Incentives where the performance period ended during the financial year.
10. Christer Gardell retired from the Board on 4 December 2019.
11. Friederike Helfer joined the Board on 4 December 2019.

Additional note:

12. Total 2018 Director remuneration for the Directors who served during 2018 was £4.171m.

Annual Report on Directors' Remuneration continued

Base salary and fees

The Chief Executive's salary was increased by 14% to £600,000 p.a. with effect from 1 January 2019. The Chief Financial Officer's base salary remained at £350,000 p.a. during 2019.

In December 2019, the Committee reviewed the salaries of the CEO and CFO. Under the terms of his appointment, the CEO is entitled to an annual review. The CFO's salary was reviewed under the terms of the current policy, having not received an adjustment since 1 January 2018. After reviewing the performance of both Directors, the Committee concluded that it was appropriate to increase the CEO's salary by 3% to £618,000 in line with the UK workforce and that of the CFO by 10% to £385,000. Whilst the CFO's increase (equivalent to 4.9% p.a. for the two-year period since his last salary review) is higher than the average annual salary increase to our UK staff over the equivalent period of 3.5% p.a., the Committee considered this was appropriate given the CFO's performance and continued development in his role.

With effect from 1 January 2019, the Chairman's fee was increased to £205,000, and the Non-executive Directors' fees were increased to £50,000 p.a. No changes were made to the supplementary fees, which remained at £15,000 p.a. for the Chairmen of the Audit and Remuneration Committees, and £5,000 for the Senior Independent Director. Neither the Chairman nor the other Non-executive Directors are members of the Group's pension plans, nor do they participate in the Group's incentive schemes. There are no changes to the Chairman's or the other Non-executive Directors' fees in 2020.

Pension arrangements – audited

In accordance with their service agreements, Patrick André and Guy Young are entitled to pension allowances of 25% of base salary. This allowance can be used to participate in Vesuvius' pension arrangements, be invested in their own pension arrangements or be taken as a cash supplement (or any combination of these alternatives). The Remuneration Committee has determined that this level of pension allowance will be frozen at the 1 January 2020 amount and reduced over time such that by the end of 2022 it will be reduced to that of the majority of the workforce.

Annual Incentive

The Executive Directors are eligible to receive an Annual Incentive calculated as a percentage of base salary, based on achievement against specified financial targets and personal objectives. Each year, the Remuneration Committee establishes the performance criteria for the forthcoming year. The financial targets are set by reference to the Company's financial budget. The target range is set to ensure that Annual Incentives are only paid out at maximum for significantly exceeding performance expectations. The Remuneration Committee considers that the setting and attainment of these targets is important in the context of achievement of the Company's longer-term strategic goals.

The Annual Incentive has a threshold level of performance below which no award is paid, a target level and a maximum performance level at which a maximum award is earned.

2019 Annual Incentive

For 2019, the maximum Annual Incentive potential for the Executive Directors was 125% of base salary and their target Annual Incentive potential was 62.5% of base salary.

For the financial year 2019, the Executive Directors' Annual Incentives were based 60% on Group headline earnings per share, 20% on the Group's working capital to sales ratio (based on the 12-month moving average) and 20% on specified personal objectives.

Financial targets

The 2019 Vesuvius Group headline earnings per share performance targets set out below were set at the December 2018 full-year average foreign exchange rates, being the rates used for the 2019 budget process:

Threshold:	On-target:	Maximum:
52.2 pence	54.9 pence	57.5 pence

The 2019 Group's working capital to sales ratio targets were set as follows:

Threshold:	On-target:	Maximum:
23.5%	23.0%	22.5%

In assessing the Group's performance against these targets, the Committee uses a constant currency approach. Thus, the 2019 full-year EPS performance was retranslated at December 2018 full-year average foreign exchange rates to establish performance. This is consistent with practice in previous years.

In 2019, Vesuvius' retranslated EPS performance at the December 2018 full-year average foreign exchange rates was 45.2 pence, and working capital to sales ratio was 24.0%. Consequently EPS performance was below threshold and the Group's working capital to sales ratio was also below threshold. As a result, no payouts are due in respect of the financial performance metrics of the 2019 Annual Incentive.

Personal objectives

In 2019, a proportion (20%) of the Annual Incentive for Executive Directors (representing 25% of base salary out of the maximum 125% bonus entitlement) was based on the achievement of personal objectives. The Committee considered the appropriateness of paying Directors' incentives under the personal objectives element of the Annual Incentive for 2019 when neither of the financial targets had been met. Given that the personal objectives are linked to key strategic, organisational and operational projects with measurable targets, the Committee concluded that such payouts are in order. A summary of the objectives set and performance achieved is set out on the opposite page.

Patrick André

Summary of objective	Summary outcome
Drive Group performance	<ul style="list-style-type: none"> > Continued focus on existing restructuring, and launched new proposals to respond to market activity. Eight plants closed in 2019. Savings of £16.4m in 2019 > Delivered improved cash management. Cash conversion of 120% > Maintained focus on the importance of quality initiatives and reporting, and swift response to reported complaints
Reinforce talent management	<ul style="list-style-type: none"> > Ensured the successful integration of recently joined managers into Group operations > Supported the reorganisation of HR, finance and IT functions. New CIO and Head of Finance appointed > Led the Group-wide engagement survey with 91% participation rate and drove action plans based on results
Implementation of Group Strategy	<ul style="list-style-type: none"> > Laid groundwork for improved longer-term return on sales > Championed the delivery of targeted strategic capex projects to improve manufacturing efficiency. Increased capacity and accelerated automation in Mexico and focused on US challenges > Closed the acquisition of CCPI in pursuit of growth strategy and integrated the business into the Group

In summary, after considering performance as outlined above, the Committee approved an Annual Incentive pay-out of 13.96% of base salary, out of the 25%, in respect of the personal objectives of Patrick André.

Guy Young

Summary of objective	Summary outcome
Improve Group financial control and metrics	<ul style="list-style-type: none"> > Streamlined internal financial processes to support better financial analysis, with monthly results finalisation accelerated > Supported targeted asset sales. Sale of two US properties and planning for further rationalisation > Delivered improved cash management
Leadership of finance function	<ul style="list-style-type: none"> > Strengthened personal oversight of key finance functions > Enhanced team structure and personnel to drive efficiency and performance
Enhance performance of shared services	<ul style="list-style-type: none"> > Successfully integrated previously outsourced European Shared Service Centre in Krakow > Conducted further work on operating cost of global shared services
Performance of tax department	<ul style="list-style-type: none"> > Appointed and integrated new Head of Tax > Championed strategic internal tax projects, including delivering target plan of cash tax savings at flagship sites in Germany and Poland
Efficiency and performance of IT function	<ul style="list-style-type: none"> > Appointed and integrated new Chief Information Officer > Drove structuring and commencement of key IT infrastructure projects > Enhanced operating technology performance in key NAFTA manufacturing sites

In summary, after considering performance as outlined above, the Committee approved an Annual Incentive pay-out of 18.16% of base salary, out of the 25%, in respect of the personal objectives of Guy Young.

The total Annual Incentive awards payable to Patrick André and Guy Young in respect of their services as a Director during 2019 are therefore 13.96% and 18.16% of salary respectively. 33% of these Annual Incentive payments will be deferred into awards over shares, to be held for a period of three years.

2020 Annual Incentive

In order to give the Committee flexibility during the three-year Policy period, the new 2020 Remuneration Policy proposes increasing the maximum Annual Incentive opportunity that can be offered under the Policy to Executive Directors from 125% to 150% of salary. The Committee has, however, confirmed that it does not plan to use this flexibility in 2020, and therefore the Annual Incentive opportunity for the Executive Directors in 2020 will be unchanged at 125% of salary, with potential pay-outs of 62.5% of base salary for the achievement of target performance in all three elements. Pay-outs will commence and increase incrementally from 0% once the threshold performance for any of the three elements has been met. The structure of the Annual Incentive will also remain the same as for 2019: 60% of the Executive Directors' Annual Incentives will therefore be based on Group headline earnings per share, 20% on the Group's working capital to sales ratio (based on the 12-month moving average) and 20% on the achievement of personal objectives. The Company will not be disclosing the targets set until after the relevant performance period has ended because of commercial sensitivities. The personal objectives for 2020 are all non-financial or job-specific in nature and track performance against key strategic, organisational and operational goals. 33% of any Annual Incentive earned will be deferred into awards over shares, to be held for a period of three years.

Annual Report on Directors' Remuneration continued

Deferred Share Bonus Plan allocations – audited

In 2018 and 2019, 33% of the cash Annual Incentives earned by Patrick André and Guy Young in respect of their periods of service as Directors of Vesuvius plc during 2017 and 2018 respectively were deferred into shares under the Company's Deferred Share Bonus Plan. The following table sets out details of these awards:

Grant and type of award	Total share allocations as at 1 Jan 2019	Additional shares allocated during the year	Allocations lapsed during the year	Shares vested during the year	Total share allocations as at 31 Dec 2019	Market price of the shares on the day before award (p)	Earliest vesting date
Patrick André							
15 March 2018 ¹							
Deferred Bonus Shares	10,128	—	—	—	10,128	605.5	15 Mar 2021
14 March 2019 ²							
Deferred Bonus Shares	—	29,646	—	—	29,646	608	14 Mar 2022
Total	10,128	29,646	—	—	39,774		
Guy Young							
15 March 2018 ¹							
Deferred Bonus Shares	18,118	—	—	—	18,118	605.5	15 Mar 2021
14 March 2019 ²							
Deferred Bonus Shares	—	19,028	—	—	19,028	608	14 Mar 2022
Total	18,118	19,028	—	—	37,146		

Notes:

- In 2018, Patrick André and Guy Young were awarded Annual Incentive bonuses in respect of their service as Directors of Vesuvius plc of £185,544 and £331,906 respectively. 33% of these bonuses were paid in deferred shares under the Vesuvius Deferred Share Bonus Plan. These shares will vest on the third anniversary of their award date.
- In 2019, Patrick André and Guy Young were awarded Annual Incentive bonuses in respect of their service as Directors of Vesuvius plc of £546,131 and £350,525 respectively. 33% of these bonuses were paid in deferred shares under the Vesuvius Deferred Share Bonus Plan. The allocations of shares were made on 14 March 2019 and were calculated based upon the average closing mid-market price of Vesuvius' shares on the five dealing days before the award was made, being £6.079. The total value of these awards based on this share price was £180,218 and £115,671 respectively. There are no additional performance conditions applicable to these awards, therefore these shares will vest in full on the third anniversary of their award date.

Additional note:

- The mid-market closing price of Vesuvius' shares during 2019 ranged between 341 pence and 642 pence per share and on 31 December 2019, the last dealing day of the year, was 500 pence per share.

Longer-term Pay (LTIPs) – audited

Performance Share awards are allocated to the Executive Directors under the Vesuvius Share Plan (VSP). In accordance with the Remuneration Policy and the rules of the VSP, they are eligible to receive, on an annual basis, a Performance Share award with a face value of up to 200% of salary. Vesting of 50% of shares awarded is based upon the Company's three-year TSR performance relative to that of the constituent companies of the FTSE 250 (excluding investment trusts), and 50% on headline EPS growth. The level of compound headline EPS growth specified in the targets is set by the Remuneration Committee each year, taking into account the Group's prospects and the broader global economic environment. The schedule of EPS targets is designed at the maximum level to be highly challenging, whilst remaining an effective incentive for the management team. The EPS and TSR measures operate independently. The use of these performance measures is intended to align executive remuneration with shareholders' interests. UK executives receive awards in the form of nil-cost options with a flexible exercise date and non-UK executives receive conditional awards which are exercised on the date of vesting. Performance Share awards vest after three years and, commencing with awards made in 2019, are then subject to a further two-year holding period.

On 14 March 2019, Patrick André and Guy Young received allocations of Performance Shares worth 200% and 150% of their base salaries, respectively. The Remuneration Committee has determined that Patrick André will again receive a Performance Share award in 2020 equivalent in value to 200% of his base salary and Guy Young an award equivalent in value to 150% of his base salary, subject to the application of the Committee's

discretion to address concerns about share price volatility as set out in the Remuneration overview on page 105 of this Report.

The performance period applicable to the awards made in 2017 ended on 31 December 2019. The TSR performance during this three-year performance period was assessed against the comparator group and it was determined that the Company's performance was just above median; as a result, 12.64% of Performance Share awards will vest under the TSR performance element.

In 2018, the Board resolved to adjust the accounting treatment for the Group's US Deferred Tax Asset, recognising its utilisation through headline trading profit. This change was entirely unrelated to Group financial performance (and had no bearing on incentive outcomes), but required the Group's EPS for the base year of the performance period of the 2017 awards to be adjusted accordingly, to ensure that the effects of this decision were neutralised as performance was evaluated. This resulted in a restated 2016 EPS of 29.6p. On this basis, the Group's annual compound headline EPS growth over the performance period was 15%. As a result, 50% of Performance Share awards will vest under the EPS element, giving a total vesting of 62.64%. These awards will vest in March 2020 and in respect of Patrick André's 2017 'top-up' award in September 2020.

As described in the Remuneration Policy, prior to the vesting of Performance Shares the Remuneration Committee reviews the underlying financial performance of the Company over the performance period to ensure that the vesting is justified, and to consider whether to exercise its discretion to make any amendments. Having undertaken this analysis in 2020, the

Committee concluded that vesting of the 2019 VSP awards was appropriate. For grants of Performance Shares under the VSP from 2019 onwards, the Committee determined that this discretion be extended to include consideration of certain non-financial matters, the occurrence of which may make full or partial vesting inappropriate.

Targets for the Performance Share awards – audited

TSR ranking relative to FTSE 250 excluding investment trusts	Vesting percentage	Annual compound headline EPS growth	Vesting percentage
Below median	0%	Less than 3%	0%
Median	12.50%	3%	12.50%
Between median and upper quintile	Pro rata between 12.50% and 50%	Between 3% and 6%	Pro rata between 12.50% and 25%
Upper quintile and above	50%	6%	25%
		Between 6% and 15%	Pro rata between 25% and 50%
		15% or more	50%

Vesuvius Performance Share award allocations – audited

The following table sets out the Performance Share awards that were allocated in 2016, 2017, 2018 and 2019 under the Vesuvius Share Plan:

Grant and type of award	Total share allocations as at 1 Jan 2019	Additional shares allocated during the year	Allocations lapsed during the year	Shares vested during the year	Total share allocations as at 31 Dec 2019	Market price of the shares on the day before award (p)	Performance period	Earliest vesting date	End of holding period ¹
Patrick André									
8 April 2016²							1 Jan 16 – 31 Dec 18		
Performance Shares	92,746	—	—	92,746	—	291.7	8 Apr 2019	n/a	
16 March 2017^{3,5}							1 Jan 17 – 31 Dec 19		
Performance Shares	60,413	—	—	—	60,413	524.5	16 Mar 2020	n/a	
1 September 2017^{4,5}							1 Jan 17 – 31 Dec 19		
Performance Shares	42,257	—	—	—	42,257	578	1 Sep 2020	n/a	
15 March 2018⁶							1 Jan 18 – 31 Dec 20		
Performance Shares	173,697	—	—	—	173,697	605.5	15 Mar 2021	n/a	
14 March 2019⁷							1 Jan 19 – 31 Dec 21		
Performance Shares	—	197,400	—	—	197,400	608	14 Mar 2022	14 Mar 2024	
Total	369,113	197,400	—	92,746	473,767				
Guy Young									
8 April 2016²							1 Jan 16 – 31 Dec 18		
Performance Shares	128,739	—	—	128,739	—	291.7	8 Apr 2019	n/a	
16 March 2017^{3,5}							1 Jan 17 – 31 Dec 19		
Performance Shares	93,355	—	—	—	93,355	524.5	16 Mar 2020	n/a	
15 March 2018⁶							1 Jan 18 – 31 Dec 20		
Performance Shares	86,848	—	—	—	86,848	605.5	15 Mar 2021	n/a	
14 March 2019⁷							1 Jan 19 – 31 Dec 21		
Performance Shares	—	86,362	—	—	86,362	608	14 Mar 2022	14 Mar 2024	
Total	308,942	86,362	—	128,739	266,565				

Notes:

- Performance shares granted from 2019 onwards are subject to a further two year holding period.
- In 2016, Guy Young received an allocation of Performance Shares worth 125% of his base salary, being 128,739 shares. In addition, prior to his appointment as Chief Executive, Patrick André received an award of 92,746 shares in respect of his role as President, Flow Control. Performance Shares that were allocated in 2016 had performance conditions to be tested over the financial years 2016, 2017 and 2018. In accordance with the Company's achievement of the specified performance conditions, 100% of Patrick André's and Guy Young's Performance Shares, being 92,746 shares and 128,739 shares respectively, vested on 8 April 2019. In addition, Messrs André and Young were given cash payments of £47,927 and £66,526 respectively, equivalent to the value of the dividends that would have been paid on the number of shares that vested in respect of dividend record dates occurring during the period between the award date and the date of vesting. The aggregate amount of gains made by the Directors on awards that vested during the year was £1,358,511.

Annual Report on Directors' Remuneration continued

- On 16 March 2017, Guy Young received an allocation of Performance Shares worth 150% of his base salary, being 93,355 shares. In addition, prior to his appointment as Chief Executive, Patrick André received an award of 60,413 shares in respect of his role as President, Flow Control. Patrick André's March 2017 Performance Share award is subject to Flow Control performance conditions. Under these, 7,552 of the 60,413 shares awarded were deemed to have met the performance condition applicable in the first year, and 7,552 shares were deemed to have met the performance condition applicable in the second year. Having remeasured the performance at the end of 2019 for the full performance period, 62.64% of the shares are deemed to have met the performance condition.
- Following his promotion to Chief Executive on 1 September 2017, Patrick André received an additional award of 42,257 Performance Shares in the form of a conditional award. This award brought his total award of Performance Shares in 2017 to 200% of his salary on a prorated basis, which is the maximum annual award for the Chief Executive as determined by the Vesuvius Remuneration Policy.
- In accordance with the Company's achievement of the specified performance conditions, 62.64% of Guy Young's March 2017 award of Performance Shares and 62.64% of Patrick André's March and September 2017 awards of Performance Shares, being 58,478 shares and 64,313 shares respectively, are due to vest on 16 March and 1 September 2020. In addition, the Remuneration Committee has determined that Messrs André and Young will be given additional shares equivalent in value to the dividends that would have been paid on the number of shares that are due to vest in respect of dividend record dates occurring during the period between the award date and the date of vesting of their 2017 Performance Share. The value of the dividends that have already accrued on these shares is £31,156 and £32,397 respectively. The awards due to vest to Patrick André in September 2020 may also accrue further dividends prior to vesting.
- On 15 March 2018, Patrick André and Guy Young received allocations of Performance Shares worth 200% and 150% of their base salaries, being 173,697 shares and 86,848 shares respectively. These allocations were calculated based upon the average closing mid-market price of Vesuvius' shares on the five dealing days before the award was made, being £6.045. The total value of these awards based on this share price on the date of grant was £1,049,998 and £524,996 respectively.
- On 14 March 2019, Patrick André and Guy Young received allocations of Performance Shares worth 200% and 150% of their base salaries, being 197,400 shares and 86,362 shares respectively. These allocations were calculated based upon the average closing mid-market price of Vesuvius' shares on the five dealing days before the award was made, being £6.079. The total value of these awards based on this share price was £1,199,994 and £524,994 respectively. The Committee did not exercise any discretion to adjust the level of awards made.

Additional notes:

- If the respective performance conditions for Patrick André's and Guy Young's awards are not met, then the awards will lapse. If the threshold level of either of the two performance conditions applicable to the awards is met, then 12.50% of the awards will vest.
- The Remuneration Committee also has the discretion to award cash or shares equivalent in value to the dividend that would have been paid during the vesting period on the number of shares that vest.
- The mid-market closing prices of Vesuvius' shares during 2019 ranged between 341 pence and 642 pence per share and on 31 December 2019, the last dealing day of the year, was 500 pence per share.

Malus/clawback arrangements in 2020

Vesuvius has malus and clawback arrangements in respect of Executive Directors' variable remuneration. The structure of those arrangements is outlined in our Remuneration Policy.

Statement of Directors' shareholding – audited

The interests of Directors and their closely associated persons in ordinary shares as at 31 December 2019, including any interests in share options and shares provisionally awarded under the Vesuvius Share Plan, are set out below:

	Beneficial holding in shares	Outstanding share incentive awards	
		With performance conditions ¹	Without performance conditions ²
Executive Directors			
Patrick André	55,015	473,767	39,774
Guy Young	84,163	266,565	37,146
Non-executive Directors			
John McDonough CBE (Chairman)	100,000	—	—
Friederike Helfer ³	—	—	—
Hock Goh	5,000	—	—
Jane Hinkley	12,000	—	—
Douglas Hurt	18,000	—	—
Holly Koepfel	27,500	—	—

Notes:

- Patrick André and Guy Young hold awards over 473,767 shares and 266,565 shares respectively; these have all been granted as Performance Shares under the Vesuvius Share Plan. The awards were all granted subject to performance conditions.
- Patrick André and Guy Young hold awards over 39,774 shares and 37,146 shares respectively, granted under the Deferred Share Bonus Plan. These awards are not subject to any additional performance conditions.
- Friederike Helfer is a Partner of, and has a financial interest in, Cevian Capital which held 21.11% of Vesuvius' issued share capital as at 31 December 2019 and at the date of this report.

Additional notes:

- None of the other Directors, nor their spouses, nor their minor children, held non-beneficial interests in the ordinary shares of the Company during the year.
- There were no changes in the interests of the Directors in the ordinary shares of the Company in the period from 1 January 2020 to the date of this Report.
- All awards under the Vesuvius Share Plan are subject to performance conditions and continued employment until the relevant vesting date as set out on pages 120 and 121.
- Full details of Directors' shareholdings and incentive awards are given in the Company's Register of Directors' Interests, which is open to inspection at the Company's registered office during normal business hours.

Payments to past Directors and loss of office payments – audited

There were no payments made to any Director for loss of office during the year ended 31 December 2019, and no payments were made to any other past Directors of the Company during the year ended 31 December 2019.

Shareholding guidelines

The Remuneration Committee encourages Executive Directors to build and hold a shareholding in the Company. Under the 2017 Remuneration Policy, the required holding of the Chief Executive was equivalent in value to at least 200% of salary, and that required of other Executive Directors was equivalent in value to at least 100% of salary. Under the proposed new Remuneration Policy, the required holding is 200% of salary for all Executive Directors. Executive Directors are required to retain at least 50% (measured as the value after tax) of any shares received through the operation of share schemes; in addition, permission to sell shares held – whether acquired through the operation of share schemes or otherwise – will not be given, other than in exceptional circumstances, if, following the disposal, the shareholding requirements have not been achieved or are not maintained.

Compliance with the shareholding policy is tested at the end of each year for application in the following year. Under the 2020 Remuneration Policy, the valuation of any holding will be taken at the higher of: (1) the share price on the date of vesting of any shares derived from a share award, in respect of those shares only; and (2) the average of the closing prices of a Vesuvius ordinary share for the trading days in that December.

Executive Directors' shareholdings – audited

As at 31 December 2019, the Executive Directors' shareholdings against the shareholding guidelines contained in the 2017 Directors' Remuneration Policy in force on that date (using the Company's share price averaged over the trading days of the period 1 December to 31 December 2019, of 480.96 pence per share) were as follows:

Director	Actual share ownership as a percentage of salary at 31 Dec 2019	Policy share ownership as a percentage of salary	Policy met?
Patrick André	76%	200%	In the build-up period
Guy Young	167%	100%	Yes

Annual changes in Chief Executive pay versus employee pay

The table below shows the percentage change in the remuneration of the Chief Executive – comprising salary, taxable benefits and Annual Incentive – and comparable data for UK salaried employees. The UK salaried employee workforce was chosen as a fair representation of a suitable comparator group as the Chief Executive Patrick André is based in the UK (albeit with a global role and responsibilities) and levels of pay vary widely across the Group depending on geography and local market conditions.

	Chief Executive			UK salaried employee workforce (average per capita)
	2019 (£000)	2018 (£000)	% change	% change
Salary	600	525	14.29	2.80
Taxable benefits	118	203	(41.87)	(7.09)
Annual bonus	84	546	(84.66)	(81.21)

Annual Report on Directors' Remuneration continued

CEO pay ratios

	Year	Method	25th percentile pay ratio	50th percentile (median) pay ratio	75th percentile pay ratio
Total remuneration (£)	2018	n/a	58:1	43:1	28:1
Total remuneration (£)	2019	Option A	35:1 (37,119)	28:1 (45,000)	17:1 (75,293)
Salary (£)	2019	Option A	22:1 (27,338)	15:1 (39,890)	9:1 (66,784)

The table above shows the Chief Executive pay ratios versus our UK employees for 2019. The pay ratios compare amounts disclosed in the single total figure table for the Group Chief Executive to the annual full-time equivalent remuneration of our UK employees for 2019. The data has been calculated in accordance with 'Option' A in The Companies (Miscellaneous Reporting) Regulations 2018, because it allows the Company to show the total annualised full-time equivalent remuneration (salary, incentives, allowances, fees, taxable benefits) and percentiles across the financial year as at 31 December 2019.

Amounts have been annualised for those who joined part way through the year or who are on part-time arrangements and exclude those who left the organisation during the reporting period.

The approach to calculating the pay ratios is consistent with the prior year and there have not been any changes to the compensation models in the reporting period.

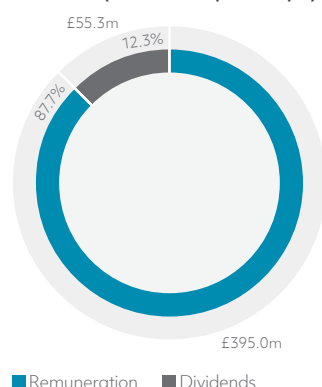
The reduction in pay ratios compared with last year can be attributed to a number of factors, including the median UK employee total remuneration (excluding CEO) remaining similar to the prior year despite the lower annual incentive pay-outs (less than half of the UK employees participate in an annual incentive); the Long-Term Incentive Plan paying out at a lower rate than the prior year for the CEO (and his leadership team) which constitutes a larger proportion of total remuneration than for employees who do not participate in the plan; a reduction in the number of lower paid roles in the UK; and an increase in the UK employee median salary compared with last year (excluding the CEO).

On balance, the Committee feels that the formulaic outcome against the financial performance targets set is a fair reflection of performance and is satisfied that the resulting compensation for the Group's leadership team is an appropriate reflection of the performance delivered. The Committee is also comfortable that the principles applied and the quantum of compensation are appropriate across the Group's employee base. These are regularly benchmarked to ensure market competitiveness. There is a consistent approach of measuring against both business and personal performance for all those who participate in incentive programmes. The Group continues to monitor the effectiveness of all compensation practices to identify future opportunities to ensure they remain fair, consistent and in line with best practice.

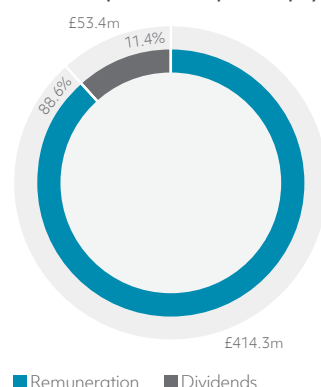
Annual spend on employee pay¹ versus shareholders' distributions²

The charts below show the annual spend on all employees (including Executive Directors) compared with distributions made and proposed to be made to shareholders for 2018 and 2019:

Relative importance of spend on pay (2019) £m



Relative importance of spend on pay (2018) £m



	2019 (£m)	2018 (£m)	Change
Employee pay ¹	395.0	414.3	(4.7)%
Dividends ² (based on final proposed dividend)	55.3	53.4	3.6%

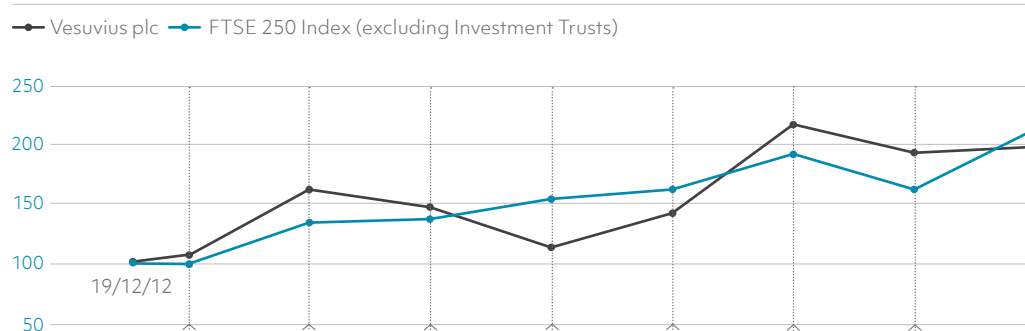
Notes:

- Employee pay includes wages and salaries, social security, share-based payments and pension costs, and other post-retirement benefits. See Note 8 to the Group Financial Statements.
- Shareholder distributions/dividends includes interim and final dividends paid in respect of each financial year. See Note 24 of the Group Financial Statements.

TSR performance and Chief Executive pay

The TSR performance graph compares Vesuvius TSR performance with that of the same investment in the FTSE 250 Index (excluding investment trusts). This index has been chosen as the comparator index to reflect the size, international scope and diversity of the Company. TSR is the measure of the returns that a company has provided for its shareholders, reflecting share price movements and assuming reinvestment of dividends. The demerger of Vesuvius plc was effective on 19 December 2012 and therefore the graph shows the period from 19 December 2012 to 31 December 2019.

Vesuvius' total shareholder return compared against total shareholder return of the FTSE 250 index (excluding investment trusts) since demerger



Chief Executive pay – financial year ended

financial year ended	31/12/12	31/12/13	31/12/14	31/12/15	31/12/16	31/12/17	31/12/18	31/12/19
Total remuneration (single figure (£000))	£1,227	£2,447	£1,519	£752	£1,173	£1,675 ¹ £465 ²	£2,022	£1,263
Annual variable pay (% of maximum)	0%	100%	64%	0%	50%	81% ¹ 85% ²	83%	11%
Long-term variable pay (% of maximum)	67%	28%	27%	0%	0%	43.7% ¹ n/a ²	100%	62.6%

Notes:

1. Amounts shown in respect of François for 2017 reflect payments in respect of his service as Chief Executive from 1 January 2017 to 31 August 2017 and the full value of his Vesuvius Share Plan award in relation to the performance period 2015–2017.
2. Amounts shown in respect of Patrick André for 2017 reflect payments in respect of his service as Chief Executive from 1 September 2017 to 31 December 2017.

Statement on shareholder voting

At the last AGM (which was held on 15 May 2019) the resolution concerning the advisory vote on the Directors' Remuneration Report for 2019 received 180,165,253 votes (76.91%) in favour and 54,091,750 votes against (23.09%); 671,069 votes were withheld. Whilst a clear majority of shareholders were supportive of the resolution, three of the Company's larger shareholders, representing 22.67% of the Company's issued share capital, voted against the resolution. The Remuneration Committee invited a dialogue with these shareholders and spoke with two of them. These two investors' concerns principally related to the level of salary increase awarded to the Chief Executive for 2019. The Remuneration Committee and the Board discussed these concerns. The Company's rationale for its approach to this matter was set out in detail in the Directors' Remuneration Report in the 2018 Annual Report and Financial Statements and was discussed further in these shareholder meetings. The Committee and the Board continues to believe that the salary increase for the Chief Executive, which was supported by the majority of the shareholders, was appropriate.

At the 2017 AGM, when the Company's Remuneration Policy was last put to the vote, the resolution received 238,743,173 (98.86%) in favour and 2,762,888 votes (1.14%) against; 1,454,874 votes were withheld. The new 2020 Remuneration Policy will be tabled for a shareholder vote at the 2020 AGM to be held on 13 May 2020, alongside the advisory vote on the Directors' Remuneration Report.

The Chairman of the Remuneration Committee contacted each of the Company's largest shareholders and key governance agencies at the beginning of the year, outlining the Committee's proposals for the 2020 Remuneration Policy and inviting comments. Vesuvius received responses from each governance agency contacted and from half of the shareholders. The Company entered into dialogue with a number of shareholders. The overall response has been supportive, both of the developments in the 2020 Remuneration Policy and to the changes proposed to executive remuneration.

The Directors' Remuneration Report has been approved by the Board and is signed on its behalf by

Jane Hinkley

Chairman, Remuneration Committee

27 February 2020

Directors' Report

Directors' Report

The Directors submit their Annual Report together with the audited financial statements of the Group and of the Company, Vesuvius plc, registered in England and Wales No. 8217766, for the year ended 31 December 2019.

The Companies Act 2006 requires the Company to provide a Directors' Report for Vesuvius plc for the year ended 31 December 2019.

Information incorporated by reference

The information that fulfils this requirement and which is incorporated by reference into, and forms part of, this report is included in the following sections of the Annual Report:

- > The Section 172(1) statement
- > The Non-financial information section
- > The Governance section, including the Corporate Governance Statement
- > Financial instruments: the information on financial risk management objectives and policies contained in Note 25 to the Group Financial Statements

This Directors' Report and the Strategic Report contained on pages 1 to 73 together represent the management report for the purpose of compliance with DTR 4.1.8R of the UK Listing Authority's Disclosure and Transparency Rules.

Going concern	Information on the business environment in which the Group operates, including the factors that are likely to impact the future prospects of the Group, is included in the Strategic Report. The principal risks and uncertainties that the Group faces throughout its global operations are shown on pages 32 and 33. The financial position of the Group, its cash flows, liquidity position and debt facilities are also described in the Strategic Report. In addition, the Group's Viability Statement is set out within the Strategic Report on page 31. Note 25 to the Group Financial Statements sets out the Group's objectives, policies and processes for managing its capital; financial risks; financial instruments and hedging activities; and its exposures to credit, market (both currency and interest rate related) and liquidity risk. Further details of the Group's cash balances and borrowings are included in Notes 13, 14 and 25 to the Group Financial Statements. 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. On the basis of the exercise described above, the Directors have prepared a going concern statement which can be found on page 31.
Events since the balance sheet	Since 31 December 2019, there have been no material items to report.
Future developments	A full description of the activities of the Group, including performance, significant events affecting the Group in the year and indicative information in respect of the likely future developments in the Group's business, can be found in the Strategic Report.
Financial instruments	Information on Vesuvius' financial risk management objectives and policies can be found in Note 25 to the Group Financial Statements.
Research and development	The Group's investment in research and development (R&D) during the year under review amounted to £29.1m (representing approximately 2% (2018: 2%) of Group revenue). Further details of the Group's R&D activities can be found in the Operating Review section of the Strategic Report.
Political and charitable donations	In accordance with Vesuvius policy, the Group did not make any political donations or incur any political expenditure in the UK or the EU during 2019 (2018: nil). The Company made no charitable donations of more than £2,000 in 2019 (2018: nil).
Energy consumption and efficiency/greenhouse gas emissions	Information on our reporting of greenhouse gas emissions, and the methodology used to record these, is set out on page 66 of the Strategic Report. Details of the Group's energy usage for 2019, and the efficiency initiatives currently being undertaken, can be found in the Sustainability section of p64-67.
Branches	A number of the Group's subsidiary undertakings maintain branches; further details of these can be found in Note 33.1 to the Group Financial Statements.
Dividends	An interim dividend of 6.20 pence (2018: 6.00 pence) per Vesuvius ordinary share was paid on 20 September 2019 to Vesuvius shareholders. The Board is recommending a final dividend in respect of 2019 of 14.30 pence (2018: 13.80 pence) per ordinary share which, if approved, will be paid on 22 May 2020 to shareholders on the register at 17 April 2020.

Accountability and audit	A responsibility statement of the Directors and a statement by the auditor about its reporting responsibilities can be found on pages 131 and 132-138 respectively. The Directors fulfil the responsibilities set out in their statement within the context of an overall control environment of central strategic direction and delegated operating responsibility. As at the date of this report, so far as each Director of the Company is aware, there is no relevant audit information of which the Company's auditor is unaware and each Director hereby confirms that they have taken all the steps that they ought to have taken as a Director in order to make themselves aware of any relevant audit information and to establish that the Company's auditor is aware of that information.
Auditor's reappointment	PricewaterhouseCoopers LLP (PwC) was reappointed as External Auditor for Vesuvius plc for the year ended 31 December 2019, at the 2019 AGM. PwC has been Vesuvius' external Auditor since 2017 and has expressed its willingness to continue in office as Auditor of the Company for the year ending 31 December 2020. Consequently, resolutions for the reappointment of PwC as auditor of the Company and to authorise the Directors to determine their remuneration are to be proposed at the 2020 AGM.
Directors	The current Directors of the Company are Patrick André, Hock Goh, Friederike Helfer, Jane Hinkley, Douglas Hurt, Holly Koeppel, John McDonough CBE and Guy Young. Christer Gardell served on the Board until 4 December 2019, when he stepped down from the Board and was replaced by Friederike Helfer. All the Directors will retire at the 2020 AGM and offer themselves for re-election at the AGM. Biographical information for the Directors is given on pages 76 and 77. Further information on the remuneration of, and contractual arrangements for, the Executive and Non-executive Directors is given on pages 114-125 in the Directors' Remuneration Report. The Non-executive Directors do not have service agreements.
Directors' indemnities	The Directors have been granted qualifying third-party indemnity provisions by the Company and the Directors of the Group's UK Pension Plans Trustee Board (none of whom is a Director of Vesuvius plc) have been granted qualifying pension scheme indemnity provisions by Vesuvius Pension Plans Trustees Ltd. The indemnities for Directors of Vesuvius plc have been in force since the date of their appointment. The Pension Trustee indemnities were in force throughout the last financial year and remain in force.
Annual General Meeting	The Annual General Meeting of the Company will be held at The Lincoln Centre, 18 Lincoln's Inn Fields, London WC2A 3ED on Wednesday 13 May 2020 at 11.00 am.
Amendments of articles of association	The Company may make amendments to the Articles by way of special resolution in accordance with the Companies Act.
Share capital	<p>As at the date of this report, the Company had an issued share capital of 278,485,071 ordinary shares of 10 pence each; 7,271,174 of these ordinary shares are held in Treasury. Therefore, the total number of Vesuvius plc shares with voting rights is 271,213,897.</p> <p>Further information relating to the Company's issued share capital can be found in Note 9 to the Company Financial Statements.</p> <p>The Company's Articles specify that, subject to the authorisation of an appropriate resolution passed at a General Meeting of the Company, Directors can allot relevant securities under Section 551 of the Companies Act up to the aggregate nominal amount specified by the relevant resolution. In addition, the Articles state that the Directors can seek the authority of shareholders in a General Meeting to allot equity securities for cash, without first being required to offer such shares to existing ordinary shareholders in proportion to their existing holdings under Section 561 of the Companies Act, in connection with a rights issue and in other circumstances up to the aggregate nominal amount specified by the relevant resolution.</p> <p>At the AGM on 15 May 2019, the Directors were authorised to issue relevant securities up to an aggregate nominal amount of £9,040,463, and, in connection with a rights issue, to issue relevant securities up to a further nominal value of £9,040,463. In addition, the Directors were empowered to allot equity securities, or sell Treasury Shares, for cash on a non pre-emptive basis up to an aggregate nominal amount of £1,356,069, and for the purposes of financing (or refinancing, if the authority is to be used within six months after the original transaction) a transaction which the Board of the Company determines to be an acquisition or other capital investment, to allot equity securities, or sell Treasury Shares, for cash on a non pre-emptive basis up to an additional nominal amount of £1,356,069. Each of the authorities given in these resolutions expires on 30 June 2020 or the date of the AGM to be held in 2020, whichever is the earlier. The resolutions were all tabled in accordance with the terms of the Pre-Emption Group's Statement of Principles. The Directors propose to renew these authorities at the 2020 AGM for a further year. In the year ahead, other than in respect of Vesuvius' ability to satisfy rights granted to employees under its various share-based incentive arrangements, the Directors have no present intention of issuing any share capital of Vesuvius plc.</p>

Directors' Report continued

Authority for purchase of own shares	<p>Subject to the provisions of company law and any other applicable regulations, the Company may purchase its own shares. At the AGM on 15 May 2019, Vesuvius shareholders gave authority to the Company to make market purchases of up to 27,121,389 Vesuvius ordinary shares, representing 10% of the Company's issued ordinary share capital as at the latest practicable day prior to the publication of the Notice of AGM. This authority expires on 30 June 2020 or the date of the AGM to be held in 2020, whichever is the earlier. The Directors will seek renewal of this authority at the 2020 AGM.</p> <p>In 2013, the Company acquired 7,271,174 ordinary shares, representing a nominal value of £727,117 and 2.6% of the entire called-up share capital of the Company prior to the purchase. These shares were purchased pursuant to the Board's commitment to return the majority of the net proceeds of the disposal of the Precious Metals Processing division to shareholders. These shares are currently held as Treasury shares. The Company has not subsequently disposed of any of the repurchased shares. During the year, the Company did not make any further acquisitions of shares nor did it dispose of any shares previously acquired. The Company does not have a lien over any of its shares.</p>															
Share plans	<p>Vesuvius operates a number of share-based incentive plans. Under these plans, the Group can satisfy entitlements by the acquisition of existing shares, the transfer of Treasury shares or by the issue of new shares. Existing shares are held in an employee share ownership plan trust (ESOP). The Trustee of the ESOP purchases shares in the open market as required to enable the Group to meet liabilities for the issue of shares to satisfy awards that vest. The Trustee does not register votes in respect of these shares and has waived the right to receive any dividends.</p> <p>At 31 December 2018, the ESOP held 2,874,060 ordinary shares in the Company. During the year, the ESOP sold/transferred 1,226,989 shares to satisfy the vesting of awards under the Company's share-based incentive plans. As at 31 December 2019, the ESOP held 1,718,615 ordinary shares. During the year, the trustee of the ESOP purchased 71,544 ordinary shares of 10p each in Vesuvius with a nominal value of £7,154 at a total cost, including transaction costs of approximately £0.4m, to hold to satisfy the future vesting of awards under the Company's share incentive plans. The total purchases during the year represented 0.03% of the Company's called-up share capital.</p>															
Restrictions on transfer of shares and voting	<p>The Company's Articles of Association (Articles) do not contain any specific restrictions on the size of a holding or on the transfer of shares. The Directors are not aware of any agreements between holders of the Company's shares that may result in restrictions on the transfer of securities or voting rights.</p> <p>No person has any special rights with regard to the control of the Company's share capital and all issued shares are fully paid. This is a summary only and the relevant provisions of the Articles should be consulted if further information is required.</p>															
Change of control provisions	<p>The terms of the Group's committed bank facility and US Private Placement Loan Notes contain provisions entitling the counterparties to exercise termination or other rights in the event of a change of control on takeover of the Company. A number of the arrangements to which the Company and its subsidiaries are party, such as other debt arrangements and share incentive plans, may also alter or terminate on a change of control in the event of a takeover. In the context of the Group as a whole, these other arrangements are not considered to be significant.</p>															
Interests in the Company's shares	<p>The Company has been notified in accordance with DTR 5 of the Disclosure and Transparency Rules of the following interests of 3%, or more, of its issued ordinary shares:</p> <table><tr><th></th><th>As at 31 Dec 2019</th><th>As at 27 Feb 2020</th></tr><tr><td>Cevian Capital</td><td>21.11</td><td>21.11</td></tr><tr><td>Standard Life Aberdeen</td><td>13.42</td><td>14.04</td></tr><tr><td>Aberforth Partners</td><td>4.93</td><td>4.93</td></tr><tr><td>Phoenix Asset Management</td><td>4.05</td><td>4.05</td></tr></table> <p>The interests of Directors and their connected persons in the ordinary shares of the Company as disclosed in accordance with the Listing Rules of the Financial Conduct Authority are as set out on page 122 of the Directors' Remuneration Report and details of the Directors' Deferred Share Bonus Plan and Long-Term Incentive awards are set out on pages 120 and 121.</p>		As at 31 Dec 2019	As at 27 Feb 2020	Cevian Capital	21.11	21.11	Standard Life Aberdeen	13.42	14.04	Aberforth Partners	4.93	4.93	Phoenix Asset Management	4.05	4.05
	As at 31 Dec 2019	As at 27 Feb 2020														
Cevian Capital	21.11	21.11														
Standard Life Aberdeen	13.42	14.04														
Aberforth Partners	4.93	4.93														
Phoenix Asset Management	4.05	4.05														

Suppliers, customers and others	<p>Information summarising how the Directors have regard to the need to foster the Company's business relationships with suppliers, customers and others is included in the Group's Section 172(1) Statement on pages 22-27. This also details how that regard impacted the principal decisions taken by the Directors during the year.</p> <p>Our approach to business places a significant number of Vesuvius Steel employees at customer sites on a permanent basis. In the Foundry Division, our success is built on our deep understanding of customer processes and technical requirements, and our ability to assist them in delivering the greatest efficiency from their operations. During the year, our supplier audit programme covered the operations of 203 suppliers. This approach allows Vesuvius to gain a deep understanding of our suppliers' operations to ensure sustainability and quality of supply.</p> <p>Vesuvius agrees payment terms with its suppliers and seeks to pay in accordance with those terms.</p>
Equal opportunities employment	<p>Vesuvius is an equal opportunities employer, and decisions on recruitment, development, training and promotion, and other employment-related issues are made solely on the grounds of individual ability, achievement, expertise and conduct. These principles are operated on a non-discriminatory basis, without regard to race, colour, nationality, culture, ethnic origin, religion, belief, gender, sexual orientation, age, disability or any other reason not related to job performance or prohibited by applicable law. In cases where employees are injured or disabled during employment with the Group, support, including appropriate training, is provided to those employees and workplace adjustments are made as appropriate in respect of their duties and working environment, supporting recovery and continued employment.</p>
Employee engagement	<p>Information on the mechanisms through which Vesuvius engages with its workforce is included in the Section 172(1) Statement on pages 22-27.</p>
Pensions	<p>In each country in which the Group operates, the pension arrangements in place are considered to be consistent with good employment practice in that particular area. Independent advisers are used to ensure that the plans are operated in accordance with local legislation and the rules of each plan. Group policy prohibits direct investment of pension fund assets in the shares of Vesuvius plc. Outside the UK, the US, Germany and Belgium, the majority of pension plans in the Group are of a defined contribution nature.</p> <p>In 2016, the main German defined benefit plan was closed for new entrants and existing members were offered a buy-out of their benefits under this plan. Those who accepted this buy-out then joined the new defined contribution plan. The Group's UK defined benefits plan (the 'UK Plan') and the main US defined benefits plans are closed to new entrants and have ceased providing future benefits accrual, with all eligible employees instead being provided with benefits through defined contribution arrangements.</p> <p>For the Group's closed UK Plan, a Trustee Board exists comprising employees, former employees and an independent trustee. The Board currently comprises six trustee Directors, of whom two are member-nominated. The administration of the UK Plan is outsourced. The Company is mindful of its obligations under the Pensions Act 2004 and of the need to comply with the guidance issued by the Pensions Regulator. Regular dialogue is maintained between the Company and the Trustee Board of the UK Plan to ensure that both the Company and Trustee Board are apprised of the same financial and other information about the Group and the UK Plan. This is pertinent to each being able to contribute to the effective functioning of the UK Plan.</p> <p>Vesuvius continues to seek ways to de-risk its existing pension plans through a combination of asset matching, buy-in opportunities and, where prudent, voluntary cash contributions.</p> <p>The Group's net pension deficit at 31 December 2019 was £8.5m (31 December 2018: £15.3m). The improvement of £6.8m is driven by cash contributions and payments of unfunded benefits of £9.8m and from foreign exchange movements of £5.7m; offset by changes to actuarial assumptions (attributable to reducing discount rates, updated mortality assumptions and pension membership data) of £3.6m and additional accrual and administrative expenditure paid for the year of £5.1m.</p>

Directors' Report continued

Listing Rule 9.8.4C R Disclosures	The following disclosures are made in compliance with the Financial Conduct Authority's Listing Rule 9.8.4C R:	
	Disclosure requirement under LR 9.8.4R	Reference/Location
	(1) Interest capitalised by the Group during the year	None
	(2) Publication of unaudited financial information	Not applicable
	(3) Details of any Long-Term Incentive schemes	Pages 107 and 108
	(4) Director waiver of emoluments	Not applicable
	(5) Director waiver of future emoluments	Not applicable
	(6) Allotment for cash of equity securities made during the year	Not applicable
	(7) Allotment for cash of equity securities made by a major unlisted subsidiary during the year	Not applicable
	(8) Details of participation of parent undertaking in any placing made during the year	Not applicable
	(9) Details of relevant material contracts in which a Director or controlling shareholder was interested during the year	Not applicable
	(10) Contracts for the provision of services by a controlling shareholder during the year	Not applicable
	(11) Details of any arrangement under which a shareholder has waived or agreed to waive any dividends	Vesuvius plc holds 7,271,174 of its 10 pence ordinary shares as Treasury shares. No dividends are payable on these shares. The Trustee of the Company's ESOP, has agreed to waive, on an ongoing basis, any dividends payable on shares it holds in trust for use under the Company's Employee Share Plans, details of which can be found on pages 116, 120, 121 and 122
	(12) Details of where a shareholder has agreed to waive future dividends	See above
	(13) Statements relating to controlling shareholders and ensuring company independence	Not applicable

The Directors' Report has been approved by the Board and is signed, by order of the Board, by the Secretary of the Company.

Henry Knowles
Company Secretary

27 February 2020

Statement of Directors' Responsibilities in respect of the Annual Report and Financial Statements

The Directors are responsible for preparing the Annual Report and Financial Statements in accordance with applicable law and regulation.

Company law requires the Directors to prepare financial statements for each financial year. Under that law the Directors have prepared the Group Financial Statements in accordance with International Financial Reporting Standards (IFRSs) as adopted by the European Union and Company Financial Statements in accordance with United Kingdom Generally Accepted Accounting Practice (United Kingdom Accounting Standards, comprising FRS 101 Reduced Disclosure Framework, and applicable law). Under company law, the Directors must not approve the financial statements unless they are satisfied that they give a true and fair view of the state of affairs of the Group and company and of the profit or loss of the Group and Company for that period. In preparing the financial statements, the Directors are required to:

- > Select suitable accounting policies and then apply them consistently
- > State whether applicable IFRSs as adopted by the European Union have been followed for the Group Financial Statements and United Kingdom Accounting Standards, comprising FRS 101, have been followed for the Company Financial Statements, subject to any material departures disclosed and explained in the financial statements
- > Make judgements and accounting estimates that are reasonable and prudent
- > Prepare the financial statements on the going concern basis unless it is inappropriate to presume that the Group and Company will continue in business

The Directors are also responsible for safeguarding the assets of the Group and Company and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

The Directors are responsible for keeping adequate accounting records that are sufficient to show and explain the Group and Company's transactions and disclose with reasonable accuracy at any time the financial position of the Group and Company and enable them to ensure that the financial statements and the Directors' Remuneration Report comply with the Companies Act 2006 and, as regards the Group Financial Statements, Article 4 of the IAS Regulation.

The Directors are responsible for the maintenance and integrity of the Company's website. Legislation in the United Kingdom governing the preparation and dissemination of financial statements may differ from legislation in other jurisdictions.

Directors' confirmations

The Directors consider that the annual report and financial statements, taken as a whole, is fair, balanced and understandable and provides the information necessary for shareholders to assess the Group and Company's position and performance, business model and strategy.

Each of the Directors, whose names and functions are listed below, confirm that, to the best of their knowledge:

- > The Company Financial Statements, which have been prepared in accordance with United Kingdom Generally Accepted Accounting Practice (United Kingdom Accounting Standards, comprising FRS 101 Reduced Disclosure Framework, and applicable law), give a true and fair view of the assets, liabilities, financial position and profit of the Company
- > The Group Financial Statements, which have been prepared in accordance with IFRSs as adopted by the European Union, give a true and fair view of the assets, liabilities, financial position and profit of the Group
- > The Strategic Report includes a fair review of the development and performance of the business and the position of the Group and Company, together with a description of the principal risks and uncertainties that it faces

The names and functions of the Directors of Vesuvius plc are as follows:

John McDonough CBE	Chairman
Patrick André	Chief Executive
Guy Young	Chief Financial Officer
Hock Goh	Non-executive Director
Friederike Helfer	Non-executive Director
Jane Hinkley	Non-executive Director and Chairman of the Remuneration Committee
Douglas Hurt	Non-executive Director, Senior Independent Director and Chairman of the Audit Committee
Holly Koeppel	Non-executive Director

On behalf of the Board

Guy Young
Chief Financial Officer

27 February 2020

Independent Auditors' Report

to the Members of Vesuvius plc

Report on the audit of the financial statements

Opinion

In our opinion:

- > Vesuvius plc's Group financial statements and Company financial statements (the "financial statements") give a true and fair view of the state of the Group's and of the Company's affairs as at 31 December 2019 and of the Group's profit and cash flows for the year then ended;
- > the Group financial statements have been properly prepared in accordance with International Financial Reporting Standards (IFRSs) as adopted by the European Union;
- > the Company financial statements have been properly prepared in accordance with United Kingdom Generally Accepted Accounting Practice (United Kingdom Accounting Standards, comprising FRS 101 "Reduced Disclosure Framework", and applicable law); and
- > the financial statements have been prepared in accordance with the requirements of the Companies Act 2006 and, as regards the Group financial statements, Article 4 of the IAS Regulation.

We have audited the financial statements, included within the Annual Report and Financial Statements (the "Annual Report"), which comprise: the Group and Company Balance Sheets as at 31 December 2019; the Group Income Statement and Group Statement of Comprehensive Income, the Group Statement of Cash Flows, and the Group and Company Statements of Changes in Equity for the year then ended; and the notes to the

financial statements, which include a description of the significant accounting policies.

Our opinion is consistent with our reporting to the Audit Committee.

Basis for opinion

We conducted our audit in accordance with International Standards on Auditing (UK) ("ISAs (UK)") and applicable law. Our responsibilities under ISAs (UK) are further described in the Auditors' responsibilities for the audit of the financial statements section of our report. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

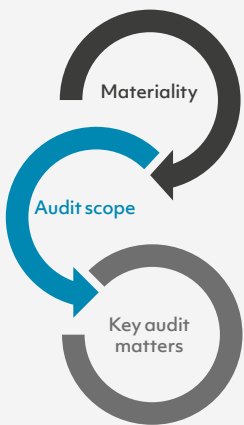
Independence

We remained independent of the Group in accordance with the ethical requirements that are relevant to our audit of the financial statements in the UK, which includes the FRC's Ethical Standard, as applicable to listed public interest entities, and we have fulfilled our other ethical responsibilities in accordance with these requirements.

To the best of our knowledge and belief, we declare that non-audit services prohibited by the FRC's Ethical Standard were not provided to the Group or the Company.

Other than those disclosed in Note 6 to the financial statements, we have provided no non-audit services to the Group or the Company in the period from 1 January 2019 to 31 December 2019.

Our Audit Approach – Overview



Materiality

- > Overall Group materiality: £8.6 million (2018: £9.4 million), based on 5% of profit before tax and separately reported items ('Headline profit before tax').
- > Overall Company materiality: £8.6 million (2018: £9.4 million), based on 1% of total assets, capped at the level of Group materiality.

Audit scope

- > Our audit included full scope audits of 17 components and specified procedures on certain balances and transactions for 11 additional components.
- > Taken together, the components at which either full scope audit work or specified audit procedures were performed enabled us to get coverage on 69% of revenue, 76% of profit before tax and 64% of Headline profit before tax.

Key audit matters

- > Impairment of goodwill (Group);
- > Impairment of investment in subsidiaries (Company);
- > Provisions for exposures (Group); and
- > Provisions for uncertainty over income tax treatments (Group).

The scope of our audit

As part of designing our audit, we determined materiality and assessed the risks of material misstatement in the financial statements.

Capability of the audit in detecting irregularities, including fraud

Based on our understanding of the Group and industry, we identified that the principal risks of non-compliance with laws and regulations related to tax, international trade regulations, health and safety and anti-bribery, and we considered the extent to which non-compliance might have a material effect on the financial statements. We also considered those laws and

regulations that have a direct impact on the preparation of the financial statements such as the Companies Act 2006. We evaluated management's incentives and opportunities for fraudulent manipulation of the financial statements (including the risk of override of controls), and determined that the principal risks were related to posting inappropriate journal entries and management bias in accounting estimates. The Group engagement team shared this risk assessment with the component auditors so that they could include appropriate audit procedures in response to such risks in their work. Audit procedures performed by the Group engagement team and/or component auditors included:

- > enquiries of Group and local management, internal audit and the Group's legal counsel (internal and, where relevant, external), including consideration of known or suspected instances of non-compliance with laws and regulations and fraud;
- > understanding and evaluation of the design and implementation of management's controls designed to prevent and detect irregularities, including compliance, whistleblowing arrangements and the results of management's investigation of such matters;
- > inspecting management reports and Board minutes in relation to health and safety matters;
- > reading key correspondence with regulatory authorities, including the Financial Reporting Council;
- > challenging assumptions and judgements made by management in their critical accounting estimates, in particular relating to impairment of goodwill and investment in subsidiaries (Company), provisions for exposures and uncertain tax positions (see related key audit matters below); and
- > identifying and testing journal entries, in particular any journal entries posted with unusual account combinations, postings by unusual users or with unusual descriptions.

There are inherent limitations in the audit procedures described above and the further removed non-compliance with laws and regulations is from the events and transactions reflected in the financial statements, the less likely we would become aware of it. Also, the risk of not detecting a material misstatement due to fraud is higher than the risk of not detecting one resulting from error, as fraud may involve deliberate concealment by, for example, forgery or intentional misrepresentations, or through collusion.

Key audit matters

Key audit matters are those matters that, in the auditors' professional judgement, were of most significance in the audit of the financial statements of the current period and include the most significant assessed risks of material misstatement (whether or not due to fraud) identified by the auditors, including those which had the greatest effect on: the overall audit strategy; the allocation of resources in the audit; and directing the efforts of the engagement team. These matters, and any comments we make on the results of our procedures thereon, were addressed in the context of our audit of the financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters. This is not a complete list of all risks identified by our audit.

Key audit matter

How our audit addressed the key audit matter

Impairment of goodwill

Goodwill arising from acquisitions has an indefinite expected useful life. At 31 December 2019, the carrying value of goodwill is £620.2 million (2018: £637.1 million - restated). Goodwill is tested for impairment at least annually at the cash-generating unit ("CGU") level. As set out in Note 17, following correspondence with the Financial Reporting Council ('FRC') the approach to impairment testing has been revised with CGUs now defined as Advanced Refractories, Flow Control, Digital Services and Foundry.

Management prepares a Value in Use model (discounted cash flow) to test for impairment of the above CGUs. We focused on this area due to challenging market conditions and because the impairment test involves a number of subjective judgements and estimates by management, many of which are forward-looking. These estimates include key assumptions surrounding the budget and strategic plan that form the basis of the projected cash flows, discount rates and long term growth rates.

Due to the change in CGUs for impairment testing this year, we also focused on the allocation of goodwill to CGUs and the determination and disclosure of a prior year restatement required.

Refer to Changes in Accounting Policies (Note 2), Impairment of Tangible and Intangible Assets (Note 17), Critical Accounting Judgements and Estimates (Note 3) and Significant issues and material judgements in the Audit Committee report (page 91).

(Group)

Our audit procedures included:

- > We understood management's basis for allocating Steel goodwill to the revised CGUs and obtained corroborative audit evidence.
- > For each CGU we obtained management's annual impairment assessment (and revised assessment for prior periods) and ensured the calculations were mathematically accurate and the methodology used was in line with the requirements of IAS 36 'Impairment of Assets'.
- > We evaluated and obtained corroborative evidence supporting the future cash flow forecasts of each CGU. We compared the forecasts used in the impairment model to the latest Board approved plans, and compared prior year budget versus actual data in order to assess historical estimation uncertainty and factor this into our challenge of current year projections. We also used external market data to challenge the profile of future projections.
- > We utilised a valuations expert to support our audit procedures over the discount rate and long term growth rate assumptions used in the impairment model and sensitised the impacts of changes in the discount rate within our view of a reasonable range.
- > We remained sceptical of the impacts of forecasting uncertainty and determined alternative sensitivity scenarios to ascertain the extent of changes in projections that would be required for the goodwill to be impaired. Our findings were discussed with the Audit Committee and appropriate sensitivity disclosures have been included in the financial statements.
- > In respect of impairment recognised as a prior year restatement we also checked that required disclosures were provided.

From our procedures we concluded that the impairment testing estimates are reasonable and that appropriate disclosures have been included within the Annual Report.

Independent Auditors' Report to the Members of Vesuvius plc continued

Key audit matter	How our audit addressed the key audit matter
<p>Impairment of investment in subsidiaries</p> <p>IAS 36 Impairment of assets requires management to consider whether there are any indicators of impairment at the year end.</p> <p>The Company holds investments in subsidiaries with a total carrying amount of £1,778m at 31 December 2019.</p> <p>Due to the quantum of the carrying amount this was an area of focus in the audit of the Company. Judgement is required to determine whether impairment indicators exist which, if identified, would require an impairment test to be performed.</p> <p>Refer to Investment in Subsidiaries, Associates and Joint Ventures (Note 7) and Critical Accounting Judgements and Estimates (Note 3) in the Company Financial Statements.</p> <p>(Company)</p>	<p>Our audit procedures included:</p> <ul style="list-style-type: none"> > We assessed the carrying value of the investments in the context that the investment carrying value exceeds the Group's market capitalisation which was considered a trigger for impairment testing. > We assessed the results of the Value in Use model used for the impairment test over goodwill which indicated headroom and that the Investment balance was not impaired. > We applied the same audit procedures set out in 'Impairment of goodwill above' to obtain evidence to support management's base case model, and challenge management on sensitivity scenarios where impairment might arise. > We checked that appropriate sensitivity disclosures have been included in the Annual Report. <p>Our findings were discussed with the Audit Committee. We concluded that no impairment is required and enhanced sensitivity disclosures have been included in the Annual Report.</p>
<p>Provisions for exposures</p> <p>The Group holds a number of provisions for exposures including those resulting from restructuring commitments, and disposal and closure costs, including legal matters. Refer to Restructuring Charges (Note 7), Provisions (Note 30), Critical Accounting Judgements and Estimates (Note 3) and Significant issues and material judgements in the Audit Committee report (page 91).</p> <p>Determining the quantum of provisions requires the directors to use judgement and estimation, and for certain provisions, obtain specialist knowledge.</p> <p>We focused on this area due to the material quantum of provisions and the judgement and estimates involved.</p> <p>(Group)</p>	<p>We obtained an understanding for the basis of each significant estimate and the key assumptions used for provisions.</p> <p>Restructuring provisions (and associated costs) related to the Group's rationalisation of its operational and support functions. The provisions predominantly included redundancies and severance payments and plant closure costs. Our testing of restructuring provisions included:</p> <ul style="list-style-type: none"> > We understood restructuring programmes and that these are distinct, timebound and with clear criteria established; > We have tested a sample of restructuring costs, ensuring this included a sceptical focus that costs are directly attributable to the Group's restructuring activities. > For costs which are provided for at the year end we have verified for a sample of transactions that a legal or constructive obligation exists. > From our procedures we concluded that restructuring costs were appropriately recognised and classified within the Annual Report. <p>For other provisions:</p> <ul style="list-style-type: none"> > We obtained supporting computations for the estimated costs and tested the mathematical accuracy and logic of these. > We discussed obligations arising with in-house and external legal counsel and inspected correspondence, where relevant. > We tested source data used as inputs into client calculations that estimate certain provisions and obtained the support of an internal expert to assess key assumptions. > We also inspected evidence of available insurance cover and that this was appropriately presented as gross of the associated provisions (within 'Other receivables') and considered the financial condition of insurance providers. > We assessed and challenged estimation uncertainties and whether there is a range of different possible outcomes and/or costs involved in respect of each provision, inspecting evidence to support that each provision held represented the best estimate. <p>From our procedures, we concluded the quantum of each provision held was appropriate.</p> <p>We also considered the impact of the provisions for exposures on the reporting and disclosure of separately reported items and Alternative Performance Measures in the financial statements and verified that appropriate disclosures are made in the Annual Report.</p>

Key audit matter	How our audit addressed the key audit matter
<p>Provisions for uncertainty over income tax treatments</p> <p>The Group implemented IFRIC 23 'Uncertainty over Income Tax Treatments' from 1 January 2019 and an adjustment was made to the opening retained earnings balance on transition. A number of provisions are held for income tax exposures arising from tax structuring, transfer pricing and local authority reviews.</p> <p>Determining the quantum of these provisions and the first time adoption of IFRIC 23 requires the directors to make judgements and estimates, and for certain areas, obtain specialist knowledge.</p> <p>Refer to Changes in Accounting Policies (Note 2), Income Tax (Note 10), Critical Accounting Judgements and Estimates (Note 3) and Significant issues and material judgements in the Audit Committee report (page 91).</p> <p>(Group)</p>	<p>Our audit procedures included:</p> <ul style="list-style-type: none"> > Where provisions were recognised for uncertainty over income tax treatments we understood the nature of the uncertainty and judgements being applied by management. We involved our tax specialists to corroborate these key judgements regarding uncertain treatments. We then further assessed assumptions used in estimating the provisions and that these were consistent with the nature of the uncertainty identified. > We further considered our understanding of the Group and the results of our component audit teams' audit procedures to assess the completeness of the income tax uncertainties identified and provided for. > The transfer pricing provision was estimated using a model. We performed testing of the accuracy of calculations and source data used in the model. Where relevant, we also obtained supporting correspondence to evidence income tax provisions. > We assessed the appropriateness of the approach used to determine provisions and that this conforms with IFRIC 23 'Uncertainty over Income Tax Treatments', including the adjustment recognised on adoption and related disclosures. > We considered the range of possible outcomes in respect of the estimate and that the Annual Report discloses the nature of the estimation uncertainty. <p>From our procedures we concluded that the estimates are reasonable and that appropriate disclosures have been included within the Annual Report.</p>

How we tailored the audit scope

We tailored the scope of our audit to ensure that we performed enough work to be able to give an opinion on the financial statements as a whole, taking into account the structure of the Group and the Company, the accounting processes and controls, and the industry in which they operate.

Vesuvius has operations in 41 countries and has 54 production sites. The Group consolidates financial information through reporting from its components which include divisions and functions at these sites.

Our audit scope was determined by considering the significance of the component's contribution to revenue, Headline profit before tax and contribution to individual financial statement line items, with specific consideration to obtaining sufficient coverage over areas of heightened risk and locations and entities where we identified other areas of higher risk.

We identified one financially significant component in Germany which comprises 11% of the Group's revenue and 7% of Headline profit before tax. The Group's remaining revenue is spread across 53 other components and there were no other individually financially significant components. The audit scope, including the German component, comprised 17 components for which

we determined that full scope audits would need to be performed and 11 components for which specific audit procedures on certain balances and transactions were performed. This collectively gave us coverage of 69% of the Group's revenue, 76% of the Group's profit before tax and 64% of the Group's Headline profit before tax. This, together with the additional procedures performed at the Group level, including testing the consolidation process, gave us the evidence we needed for our opinion on the financial statements as a whole.

In establishing the overall approach to the Group audit, we determined the type of work that needed to be performed at the components by us, as the Group engagement team, or by component auditors of other PwC network firms. Where the work was performed by component auditors, we determined the level of involvement and oversight we needed to have in the audit work at those reporting units to be able to conclude whether sufficient appropriate audit evidence had been obtained as a basis for our opinion on the financial statements as a whole. This was achieved through regular communications with the component auditors, including visits to 11 of the 17 full scope components by senior members of the Group audit team.

Independent Auditors' Report to the Members of Vesuvius plc continued

Materiality

The scope of our audit was influenced by our application of materiality. We set certain quantitative thresholds for materiality. These, together with qualitative considerations, helped us to determine the scope of our audit and the nature, timing and extent of our audit procedures on the individual financial

statement line items and disclosures and in evaluating the effect of misstatements, both individually and in aggregate on the financial statements as a whole.

Based on our professional judgement, we determined materiality for the financial statements as a whole as follows:

	Group financial statements	Company financial statements
Overall materiality	£8.6 million (2018: £9.4 million).	£8.6 million (2018: £9.4 million).
How we determined it	5% of profit before tax and separately reported items ('Headline profit before tax').	1% of total assets, capped at the level of Group materiality.
Rationale for benchmark applied	We believe that profit before tax and separately reported items ('Headline profit before tax') provides us with an appropriate basis for determining our overall Group materiality given it is a key measure used by users of the financial statements both internally and externally. Headline profit before tax is an Alternative Performance Measure presented and defined in the Annual Report and Financial Statements.	We believe that total assets is an appropriate basis for determining materiality for the Parent Company, given this entity is an investment holding company and this is an accepted auditing benchmark. The materiality was capped to the level of Group overall materiality. The Company is not an in-scope component for our Group audit.

For each component in the scope of our Group audit, we allocated a materiality that is less than our overall Group materiality. The range of materiality allocated across components was between £0.6 million and £5.7 million. Certain components were audited to a local statutory audit materiality that was also less than our overall Group materiality.

We agreed with the Audit Committee that we would report to them misstatements identified during our audit above £0.4 million (Group audit) (2018: £0.5 million) and £0.4 million (Company audit) (2018: £0.5 million) as well as misstatements below those amounts that, in our view, warranted reporting for qualitative reasons.

Going concern

In accordance with ISAs (UK) we report as follows:

Reporting obligation	Outcome
We are required to report if we have anything material to add or draw attention to in respect of the directors' statement in the financial statements about whether the directors considered it appropriate to adopt the going concern basis of accounting in preparing the financial statements and the directors' identification of any material uncertainties to the Group's and the Company's ability to continue as a going concern over a period of at least twelve months from the date of approval of the financial statements.	We have nothing material to add or to draw attention to. However, because not all future events or conditions can be predicted, this statement is not a guarantee as to the Group's and Company's ability to continue as a going concern. For example, the terms of the United Kingdom's withdrawal from the European Union are not clear, and it is difficult to evaluate all of the potential implications on the Group's trade, customers, suppliers and the wider economy.
We are required to report if the directors' statement relating to Going Concern in accordance with Listing Rule 9.8.6R(3) is materially inconsistent with our knowledge obtained in the audit.	We have nothing to report.

Reporting on other information

The other information comprises all of the information in the Annual Report other than the financial statements and our auditors' report thereon. The directors are responsible for the other information. Our opinion on the financial statements does not cover the other information and, accordingly, we do not express an audit opinion or, except to the extent otherwise explicitly stated in this report, any form of assurance thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If we identify an apparent material inconsistency or material misstatement, we are required to perform procedures to conclude whether there is a material misstatement of the financial statements or a material misstatement of the other information. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report based on these responsibilities.

With respect to the Strategic Report and Directors' Report, we also considered whether the disclosures required by the UK Companies Act 2006 have been included.

Based on the responsibilities described above and our work undertaken in the course of the audit, the Companies Act 2006 (CA06), ISAs (UK) and the Listing Rules of the Financial Conduct Authority (FCA) require us also to report certain opinions and matters as described below (required by ISAs (UK) unless otherwise stated).

Strategic Report and Directors' Report

In our opinion, based on the work undertaken in the course of the audit, the information given in the Strategic Report and Directors' Report for the year ended 31 December 2019 is consistent with the financial statements and has been prepared in accordance with applicable legal requirements. (CA06)

In light of the knowledge and understanding of the Group and Company and their environment obtained in the course of the audit, we did not identify any material misstatements in the Strategic Report and Directors' Report. (CA06)

The directors' assessment of the prospects of the Group and of the principal risks that would threaten the solvency or liquidity of the Group

We have nothing material to add or draw attention to regarding:

- > The directors' confirmation on page 31 of the Annual Report that they have carried out a robust assessment of the principal risks facing the Group, including those that would threaten its business model, future performance, solvency or liquidity.

- > The disclosures in the Annual Report that describe those risks and explain how they are being managed or mitigated.
- > The directors' explanation on page 31 of the Annual Report as to how they have assessed the prospects of the Group, over what period they have done so and why they consider that period to be appropriate, and their statement as to whether 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 period of their assessment, including any related disclosures drawing attention to any necessary qualifications or assumptions.

We have nothing to report having performed a review of the directors' statement that they have carried out a robust assessment of the principal risks facing the Group and statement in relation to the longer-term viability of the Group. Our review was substantially less in scope than an audit and only consisted of making inquiries and considering the directors' process supporting their statements; checking that the statements are in alignment with the relevant provisions of the UK Corporate Governance Code (the "Code"); and considering whether the statements are consistent with the knowledge and understanding of the Group and Company and their environment obtained in the course of the audit. (Listing Rules)

Other Code Provisions

We have nothing to report in respect of our responsibility to report when:

- > The statement given by the directors, on page 131, that they consider the Annual Report taken as a whole to be fair, balanced and understandable, and provides the information necessary for the members to assess the Group's and Company's position and performance, business model and strategy is materially inconsistent with our knowledge of the Group and Company obtained in the course of performing our audit.
- > The section of the Annual Report on page 91 describing the work of the Audit Committee does not appropriately address matters communicated by us to the Audit Committee.
- > The directors' statement relating to the Company's compliance with the Code does not properly disclose a departure from a relevant provision of the Code specified, under the Listing Rules, for review by the auditors.

Directors' Remuneration

In our opinion, the part of the Directors' Remuneration Report to be audited has been properly prepared in accordance with the Companies Act 2006. (CA06)

Independent Auditors' Report to the Members of Vesuvius plc continued

Responsibilities for the financial statements and the audit

Responsibilities of the directors for the financial statements

As explained more fully in the Statement of Directors' Responsibilities in respect of the Annual Report and Financial Statements set out on page 131, the directors are responsible for the preparation of the financial statements in accordance with the applicable framework and for being satisfied that they give a true and fair view. The directors are also responsible for such internal control as they determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the directors are responsible for assessing the Group's and the Company's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the directors either intend to liquidate the Group or the Company or to cease operations, or have no realistic alternative but to do so.

Auditors' responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs (UK) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

A further description of our responsibilities for the audit of the financial statements is located on the FRC's website at: www.frc.org.uk/auditorsresponsibilities. This description forms part of our auditors' report.

Use of this report

This report, including the opinions, has been prepared for and only for the Company's members as a body in accordance with Chapter 3 of Part 16 of the Companies Act 2006 and for no other purpose. We do not, in giving these opinions, accept or assume responsibility for any other purpose or to any other person to whom this report is shown or into whose hands it may come save where expressly agreed by our prior consent in writing.

Other required reporting

Companies Act 2006 exception reporting

Under the Companies Act 2006 we are required to report to you if, in our opinion:

- > we have not received all the information and explanations we require for our audit; or
- > adequate accounting records have not been kept by the Company, or returns adequate for our audit have not been received from branches not visited by us; or
- > certain disclosures of directors' remuneration specified by law are not made; or
- > the Company financial statements and the part of the Directors' Remuneration Report to be audited are not in agreement with the accounting records and returns.

We have no exceptions to report arising from this responsibility.

Appointment

Following the recommendation of the Audit Committee, we were appointed by the members on 10 May 2017 to audit the financial statements for the year ended 31 December 2017 and subsequent financial periods. The period of total uninterrupted engagement is 3 years, covering the years ended 31 December 2017 to 31 December 2019.

Julian Jenkins (Senior Statutory Auditor)

for and on behalf of PricewaterhouseCoopers LLP
Chartered Accountants and Statutory Auditors
London

27 February 2020

SECTION FIVE

FINANCIAL STATEMENTS

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Group Income Statement

For the year ended 31 December 2019

	Notes	2019			2018		
		⁽¹⁾ Headline performance £m	⁽¹⁾ Separately reported items £m	Total £m	⁽¹⁾ Headline performance £m	⁽¹⁾ Separately reported items £m	Total £m
Continuing operations							
Revenue	4, 5	1,710.4	—	1,710.4	1,798.0	—	1,798.0
Manufacturing costs		(1,233.5)	—	(1,233.5)	(1,291.2)	—	(1,291.2)
Administration, selling and distribution costs		(295.5)	—	(295.5)	(309.6)	—	(309.6)
Trading profit⁽²⁾	5	181.4	—	181.4	197.2	—	197.2
Amortisation of acquired intangible assets	16	—	(10.0)	(10.0)	—	(12.9)	(12.9)
Restructuring charges	7	—	(39.8)	(39.8)	—	(15.3)	(15.3)
Vacant site remediation costs		—	(4.1)	(4.1)	—	—	—
GMP equalisation charge	26	—	—	—	—	(4.5)	(4.5)
Operating profit/(loss)		181.4	(53.9)	127.5	197.2	(32.7)	164.5
Finance expense		(19.5)	—	(19.5)	(16.7)	—	(16.7)
Finance income		8.5	—	8.5	5.6	—	5.6
Net finance costs	9	(11.0)	—	(11.0)	(11.1)	—	(11.1)
Share of post-tax profit of joint ventures	33	1.0	1.1	2.1	2.8	—	2.8
Profit/(loss) before tax		171.4	(52.8)	118.6	188.9	(32.7)	156.2
Income tax (charge)/credits	10	(43.8)	11.7	(32.1)	(48.4)	36.8	(11.6)
Profit/(loss) from:							
Continuing operations		127.6	(41.1)	86.5	140.5	4.1	144.6
Discontinued operations		—	—	—	—	0.5	0.5
Profit/(loss)		127.6	(41.1)	86.5	140.5	4.6	145.1
Profit/(loss) attributable to:							
Owners of the parent		121.4	(41.1)	80.3	133.7	4.6	138.3
Non-controlling interests		6.2	—	6.2	6.8	—	6.8
Profit/(loss)		127.6	(41.1)	86.5	140.5	4.6	145.1
Earnings per share — pence	11						
Continuing operations — basic				29.8			51.1
— diluted				29.6			50.8
Total operations — basic				29.8			51.3
— diluted				29.6			51.0

(1) Headline performance is defined in Note 4.1 and separately reported items are defined in Note 2.5.

(2) Trading Profit is defined in Note 4.4.

Group Statement of Comprehensive Income

For the year ended 31 December 2019

	Notes	2019 £m	2018 £m
Profit		86.5	145.1
Items that will not subsequently be reclassified to income statement			
Remeasurement of defined benefit liabilities/assets	26.6	(3.6)	5.1
Income tax relating to items not reclassified	10.4	1.9	6.0
Items that may subsequently be reclassified to income statement			
Exchange differences on translation of the net assets of foreign operations		(73.4)	11.1
Reclassification of foreign currency translation reserve on disposal of share in joint venture		(1.1)	—
Exchange differences on translation of net investment hedges	23	14.1	(11.5)
Income tax relating to items that may be reclassified		—	—
Other comprehensive income/(loss), net of income tax		(62.1)	10.7
Total comprehensive income		24.4	155.8
Total comprehensive income attributable to:			
Owners of the parent		20.6	149.3
Non-controlling interests		3.8	6.5
Total comprehensive income		24.4	155.8
Total comprehensive income attributable to owners of the parent arises from:			
Continuing operations		20.6	148.8
Discontinued operations		—	0.5
Total comprehensive income attributable to owners of the parent		20.6	149.3

Group Statement of Cash Flows

For the year ended 31 December 2019

	Notes	2019 £m	2018 £m
Cash flows from operating activities			
Cash generated from operations	12	240.7	195.2
Interest paid		(17.3)	(16.3)
Interest received		5.2	4.8
Net interest paid		(12.1)	(11.5)
Income taxes paid		(44.5)	(41.8)
Net cash inflow from operating activities		184.1	141.9
Cash flows from investing activities			
Capital expenditure		(65.4)	(41.2)
Proceeds from the sale of property, plant and equipment		3.7	2.6
Proceeds from the sale of assets classified as held for sale		1.8	—
Acquisition of subsidiaries and joint ventures, net of cash acquired	20	(32.7)	(1.0)
Disposal of joint ventures, net of cash disposed		6.8	—
Dividends received from joint ventures		0.1	1.2
Net cash outflow from investing activities		(85.7)	(38.4)
Net cash inflow before financing activities		98.4	103.5
Cash flows from financing activities			
Proceeds from borrowings	14	154.6	34.9
Repayment of borrowings	14	(169.8)	(1.6)
Settlement of derivatives	25	(5.1)	1.8
Purchase of ESOP shares	22	—	(13.4)
Dividends paid to equity shareholders	24	(53.9)	(50.0)
Dividends paid to non-controlling shareholders		(2.8)	(1.9)
Net cash outflow from financing activities		(77.0)	(30.2)
Net increase in cash and cash equivalents	14	21.4	73.3
Cash and cash equivalents at 1 January		213.4	140.0
Effect of exchange rate fluctuations on cash and cash equivalents	14	(12.7)	0.1
Cash and cash equivalents at 31 December	13	222.1	213.4

Alternative performance measure (non-statutory):

	Continuing operations £m	Discontinued operations £m	2019 total £m	Continuing operations £m	Discontinued operations £m	2018 total £m
Free cash flow (Note 4.10)						
Net cash inflow/(outflow) from operating activities	184.1	—	184.1	142.0	(0.1)	141.9
Net retirement benefit obligations	5.1	—	5.1	3.4	—	3.4
Capital expenditure	(65.4)	—	(65.4)	(41.2)	—	(41.2)
Proceeds from the sale of property, plant and equipment	3.7	—	3.7	2.6	—	2.6
Proceeds from the sale of assets classified as held for sale	1.8	—	1.8	—	—	—
Dividends received from joint ventures	0.1	—	0.1	1.2	—	1.2
Dividends paid to non-controlling shareholders	(2.8)	—	(2.8)	(1.9)	—	(1.9)
Free cash flow (Note 4.10)	126.6	—	126.6	106.1	(0.1)	106.0

2018 Free cash flow does not reflect the transition to IFRS 16 Leases.

Group Balance Sheet

As at 31 December 2019

	Notes	2019 £m	31 Dec 2018 Restated* £m	1 Jan 2018 Restated* £m
Assets				
Property, plant and equipment	15	337.7	303.7	301.1
Intangible assets	16	708.5	724.0	725.6
Employee benefits – surpluses	26	102.6	90.8	92.4
Interests in joint ventures and associates	33	12.7	19.1	17.5
Investments		0.8	1.0	1.4
Income tax receivable		—	—	0.4
Deferred tax assets	10	94.9	94.5	61.0
Other receivables		22.1	30.1	30.9
Derivative financial instruments	25	0.5	0.7	0.2
Total non-current assets		1,279.8	1,263.9	1,230.5
Cash and short-term deposits	13	229.2	236.9	161.9
Inventories	19	212.9	244.3	222.8
Trade and other receivables	18	379.6	440.4	422.2
Income tax receivable	10	2.9	2.8	5.2
Derivative financial instruments	25	0.1	0.1	0.1
Assets classified as held for sale		—	1.7	—
Total current assets		824.7	926.2	812.2
Total assets		2,104.5	2,190.1	2,042.7
Equity				
Issued share capital	21	27.8	27.8	27.8
Retained earnings	22	2,463.1	2,432.4	2,342.7
Other reserves	23	(1,427.5)	(1,369.5)	(1,369.4)
Equity attributable to the owners of the parent		1,063.4	1,090.7	1,001.1
Non-controlling interests		51.0	50.0	45.4
Total equity		1,114.4	1,140.7	1,046.5
Liabilities				
Interest-bearing borrowings	25	303.2	455.5	410.5
Employee benefits – liabilities	26	111.1	106.1	108.9
Other payables	28	15.1	16.1	17.3
Provisions	30	31.1	38.8	34.4
Deferred tax liabilities	10	43.6	38.7	42.7
Total non-current liabilities		504.1	655.2	613.8
Interest-bearing borrowings	25	171.7	29.4	25.7
Trade and other payables	28	273.6	311.8	292.6
Income tax payable	10	14.3	29.3	34.3
Provisions	30	25.7	23.1	29.8
Derivative financial instruments	25	0.7	0.6	—
Total current liabilities		486.0	394.2	382.4
Total liabilities		990.1	1,049.4	996.2
Total equity and liabilities		2,104.5	2,190.1	2,042.7

* Restated – see Note 17.2 of the Group financial statements for an explanation and analysis of the prior year adjustments made in respect of the Balance Sheets as at 31 December 2018 and 1 January 2018.

Company number 8217766

The financial statements on pages 140 to 192 were approved and authorised for issue by the Directors on 27 February 2020 and signed on their behalf by:

Patrick André
Chief Executive

Guy Young
Chief Financial Officer

Group Statement of Changes in Equity

For the year ended 31 December 2019

	Issued share capital £m	Other reserves £m	Retained earnings £m	Owners of the parent £m	Non- controlling interests £m	Total equity £m
As at 1 January 2018 – as reported	27.8	(1,369.4)	2,370.3	1,028.7	45.4	1,074.1
Restatement upon impairment of tangible and intangible assets (Note 17.2)	—	—	(27.6)	(27.6)	—	(27.6)
As at 1 January 2018 – restated	27.8	(1,369.4)	2,342.7	1,001.1	45.4	1,046.5
Profit	—	—	138.3	138.3	6.8	145.1
Remeasurement of defined benefit liabilities/assets	—	—	5.1	5.1	—	5.1
Income tax relating to items not reclassified	—	—	6.0	6.0	—	6.0
Exchange differences on translation of the net assets of foreign operations	—	11.4	—	11.4	(0.3)	11.1
Exchange differences on translation of net investment hedges	—	(11.5)	—	(11.5)	—	(11.5)
Income tax relating to items that may be reclassified	—	—	—	—	—	—
Other comprehensive income/(loss) net of income tax	—	(0.1)	11.1	11.0	(0.3)	10.7
Total comprehensive income/(loss)	—	(0.1)	149.4	149.3	6.5	155.8
Recognition of share-based payments	—	—	3.7	3.7	—	3.7
Purchase of ESOP shares	—	—	(13.4)	(13.4)	—	(13.4)
Dividends paid (Note 24)	—	—	(50.0)	(50.0)	(1.9)	(51.9)
Total transactions with owners	—	—	(59.7)	(59.7)	(1.9)	(61.6)
As at 1 January 2019 – as reported	27.8	(1,369.5)	2,432.4	1,090.7	50.0	1,140.7
Restatement upon adoption of IFRIC 23 (Note 2.6)	—	—	1.5	1.5	—	1.5
As at 1 January 2019 – restated	27.8	(1,369.5)	2,433.9	1,092.2	50.0	1,142.2
Profit	—	—	80.3	80.3	6.2	86.5
Remeasurement of defined benefit liabilities/assets	—	—	(3.6)	(3.6)	—	(3.6)
Income tax relating to items not reclassified	—	—	1.9	1.9	—	1.9
Exchange differences on translation of the net assets of foreign operations	—	(71.0)	—	(71.0)	(2.4)	(73.4)
Reclassification of foreign currency translation reserve on disposal of share in joint venture	—	(1.1)	—	(1.1)	—	(1.1)
Exchange differences on translation of net investment hedges	—	14.1	—	14.1	—	14.1
Income tax relating to items that may be reclassified	—	—	—	—	—	—
Other comprehensive income/(loss) net of income tax	—	(58.0)	(1.7)	(59.7)	(2.4)	(62.1)
Total comprehensive income/(loss)	—	(58.0)	78.6	20.6	3.8	24.4
Recognition of share-based payments	—	—	4.5	4.5	—	4.5
Dividends paid (Note 24)	—	—	(53.9)	(53.9)	(2.8)	(56.7)
Total transactions with owners	—	—	(49.4)	(49.4)	(2.8)	(52.2)
As at 31 December 2019	27.8	(1,427.5)	2,463.1	1,063.4	51.0	1,114.4

Notes to the Group Financial Statements

1. General Information

Vesuvius plc ('Vesuvius' or 'the Company') is a public company limited by shares. It is incorporated and domiciled in England and Wales and listed on the London Stock Exchange. The nature of the operations and principal activities of the Company and its subsidiary and joint venture companies ('the Group') is set out in the Strategic Report on pages 1 to 73 and its registered address is shown on page 202.

2. Basis of Preparation

2.1 Basis of accounting

The Group Financial Statements have been prepared in accordance with International Financial Reporting Standards (IFRS) and interpretations issued by the IFRS Interpretations Committee (IFRS IC) as adopted by the European Union and with the Companies Act 2006 applicable to companies reporting under IFRS. The financial statements have been prepared under the historical cost convention, with the exception of fair value measurement applied to defined benefit pension plans, certain provisions, investments and derivative financial instruments.

2.2 Basis of consolidation

The Group Financial Statements incorporate the financial statements of the Company and entities controlled directly and indirectly by the Company (its 'subsidiaries'). Control exists when the Company has the power to direct the relevant activities of an entity that significantly affect the entity's return so as to have rights to the variable return from its activities. In assessing whether control exists, potential voting rights that are currently exercisable are taken into account. The results of subsidiaries acquired or disposed of during the year are included in the Group Income Statement from the effective date of acquisition or up to the effective date of disposal, as appropriate.

The principal accounting policies applied in the preparation of these Group Financial Statements are set out in the Notes. These policies have been consistently applied to all of the years presented, unless otherwise stated. Where necessary, adjustments are made to the financial statements of subsidiaries to bring their accounting policies into line with those detailed herein to ensure that the Group Financial Statements are prepared on a consistent basis. All intra-Group transactions, balances, income and expenses are eliminated on consolidation.

Non-controlling interests in the net assets of consolidated subsidiaries are identified separately from the Group's interest therein. Non-controlling interests consist of the amount of those interests at the date of the original business combination together with the non-controlling interests' share of profit or loss, each component of other comprehensive income, less dividends paid since the date of the combination. Total comprehensive income is attributed to the non-controlling interests even if this results in the non-controlling interests having a deficit balance.

2.3 Going concern

The Directors have prepared cash flow forecasts for the Group for a period in excess of 12 months from the date of approval of the 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 of these Financial Statements. Accordingly, they continue to adopt a going concern basis in preparing the financial statements of the Group and the Company.

2.4 Functional and presentation currency

The financial statements are presented in millions of pounds sterling, which is the functional currency of the Company, and rounded to one decimal place. Foreign operations are included in accordance with the policies set out in Note 25.1.

2.5 Disclosure of 'separately reported items'

Columnar presentation

In accordance with IAS 1, the Group has adopted a columnar presentation for its Group Income Statement, to separately identify headline performance results, as the Directors consider that this gives a useful view of the underlying results of the ongoing business. As part of this presentation format, the Group has adopted a policy of disclosing separately on the face of its Group Income Statement, within the column entitled 'Separately reported items', the effect of any components of financial performance for which the Directors consider separate disclosure would assist both in a useful understanding of the financial performance achieved for a given year and in making projections of future results.

Separately reported items

Both materiality and the nature of the components of income and expense are considered in deciding upon such presentation. Such items may include, inter alia, the financial effect of exceptional items which occur infrequently, such as major restructuring activity (which may require more than one year to complete), and significant movement in the Group's deferred tax balances such as was, for example, caused by the impact of US tax reform in 2017, together with items reported separately for consistency, such as amortisation charges relating to acquired intangible assets, profits or losses arising on the disposal of continuing or discontinued operations and the taxation impact of the aforementioned exceptional items and other items reported separately.

Notes to the Group Financial Statements continued

2. Basis of Preparation continued

2.5 Disclosure of 'separately reported items' continued

The amortisation charge in respect of intangible assets recognised on business combinations is excluded from the trading results of the Group since they are non-cash charges and are not considered reflective of the core trading performance of the Group.

In its adoption of this policy, the Company applies an even-handed approach to both gains and losses and aims to be both consistent and clear in its accounting and disclosure of such items.

2019

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 occurring 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 non-recurring costs have been treated as a separately reported item. There has been no impact upon headline performance.

2018

Following a period of sustained profitability of the Group's US business, for 2018 the Board decided to substantially increase the amount reflected on the Group's balance sheet in respect of the previously unrecognised value of US tax losses and other temporary differences. Further details of the 2018 movements are shown in Note 10.

A UK High Court judgement was made on 26 October 2018 in respect of the gender equalisation of guaranteed minimum pensions ('GMPs') for occupational pension schemes. The increase in pension liabilities resulting from this judgement has been treated for IAS 19 purposes as a plan amendment and has resulted in an increase in the pension deficit in the balance sheet and a corresponding past service cost in the income statement. This has been treated as a separately reported item so that there has been no impact upon Headline performance. We are working with the trustees of our UK pension plan and our actuarial and legal advisers to understand the extent to which the judgement crystallises additional liabilities for the UK pension plan. We estimated the impact of GMP equalisation as at 31 December 2018 to be £4.5m.

2.6 Changes in accounting policies

Initial adoption of IFRS 16 Leases

The Group has adopted IFRS 16 Leases from 1 January 2019 and, in accordance with the simplified approach, has not restated comparatives on transition. The reclassifications and adjustments arising from the new lease accounting rules are therefore recognised in the opening balance sheet on 1 January 2019.

The Group has recognised lease liabilities in relation to leases which had previously been classified as operating leases and taken the practical expedient provided for leases of low-value assets and short-term leases (shorter than 12 months). For leases that had been classified as operating leases in accordance with IAS 17, the lease liability was recognised at the present value of the remaining lease payments, discounted using the interest rate implicit in the lease if that rate could be readily determined. If that rate could not be readily determined, the lessee's incremental borrowing rate was used, calculated as the local government bond rate plus an interest rate spread. The weighted average lessee's incremental borrowing rate applied to the lease liabilities on 1 January 2019 was 4.4%.

Net debt rose accordingly due to the increase in lease liabilities, as shown in Note 25. In cases where there was an option to terminate or extend a lease, the duration of the lease assumed for this purpose reflected the Group's existing intentions regarding such options.

Lease liabilities include the net present value of the following lease payments:

- > fixed payments (including in-substance fixed payments), less any lease incentives receivable
- > variable lease payments that are based on an index or a rate
- > amounts expected to be payable by the lessee under residual value guarantees
- > the exercise price of a purchase option if the lessee is reasonably certain to exercise that option and
- > payments of penalties for terminating the lease, if the lease term reflects the lessee exercising that option

For leases previously classified as finance leases, the entity recognised the carrying amount of the lease asset and lease liability immediately before transition as the carrying amount of the right of use asset and the lease liability at the date of initial application. In determining the right of use assets, the Group has taken the practical expedient in respect of placing reliance on previous assessments on whether leases are onerous. This has resulted in adjustment of the onerous lease provision of £2.5m against the right of use assets upon transition and recognition of a lease liability. The measurement principles of IFRS 16 are only applied after that date.

The right of use asset was measured at the amount equal to the lease liability, adjusted by the amount of any prepaid or accrued lease payments relating to that lease recognised in the balance sheet as at 31 December 2018. The right-of-use asset is depreciated over the shorter of the asset's useful life and the lease term on a straight-line basis.

The recognised right of use assets relate to the following assets.

	31 December 2019 £m	1 January 2019 £m	As reported 31 December 2018 £m
Leasehold property	20.7	22.3	—
Plant and equipment	13.7	15.7	4.4
	34.4	38.0	4.4

The change in accounting policy affected the following items in the balance sheet on 1 January 2019.

	As reported 31 December 2018 £m	1 January 2019 £m	£m
Property, plant and equipment – increase	313.9	33.6	347.5
Trade and other receivables – decrease	470.5	(3.3)	467.2
Provisions – decrease	(61.9)	2.5	(59.4)
Lease liabilities – increase	(3.9)	(32.8)	(36.7)

The operating lease commitment disclosed in the Group's 2018 consolidated accounts can be reconciled to the lease liability as at 1 January 2019 as follows:

	£m
Operating lease commitment disclosed as at 31 December 2018	39.3
Add finance lease liabilities recognised already as at 31 December 2018	3.9
Less short-term and low-value leases still treated as operating leases	(6.0)
Less the effect of discounting upon the lease liability as at 1 January 2019	(4.4)
Lease liability recognised as at 1 January 2019	32.8

In contrast with the previous presentation of operating lease expenses within operating profit, the Group now recognises depreciation charges on right of use assets and interest expense from unwinding of the discount on the lease liabilities. If IFRS 16 had been applied for the 2018 Annual Report and Financial Statements, operating profit and interest expense would both have been approximately £1m higher, with an insignificant impact on net profit, and cash generated from operations would have been approximately £9m higher with a compensating £9m additional financing cash outflow so there would have been no impact on the net cash flow.

IFRIC 23 Uncertainty over Income Tax Treatments

IFRIC 23 has been applied from 1 January 2019 and clarified how the recognition and measurement requirements of IAS 12 'Income taxes' are to be applied where there is uncertainty over income tax treatments. At transition, an adjustment has been made to reduce tax liabilities and to increase opening reserves in respect of tax provisions by £1.5m.

2.7 New and revised IFRS

Certain new accounting standards and interpretations have been published that are not mandatory for 31 December 2019 reporting periods and have not been early adopted by the Group. These include the new insurance standard IFRS 17 Insurance Contracts which was issued in 2017 with the effective date of 1 January 2021. These new or amended standards or interpretations are not expected to have a significant impact on the Group's financial statements.

2.8 Financial Reporting Council (FRC) review of 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. This has resulted in our 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 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 (Sensors & Probes) and the Foundry Division. This has shown that the carrying value of the goodwill held in the Steel Digital Services (Sensors & Probes) operating segment could not be supported by value in use calculations as at 31 December 2017 and should therefore have been fully impaired at that date, resulting in an impairment of £17.4m. We have also identified an impairment of tangible fixed assets at that date 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. When reviewing the Company's 2018 Annual Report and Financial Statements, the FRC has made clear to us the limitations of its review is as follows:

- > its review is based on the 2018 Annual Report and Financial Statements only and does not benefit from a detailed knowledge of the Group's business or an understanding of the underlying transactions entered into;
- > communications from the FRC provide no assurance that the Company's 2018 Annual Report and Financial Statements are correct in all material respects and are made on the basis that the FRC (and its officers, employees and agents) accepts no liability for reliance on them by the Company or any third party, including but not limited to investors and shareholders; and
- > the FRC's role is not to verify information provided but to consider compliance with reporting requirements.

Notes to the Group Financial Statements continued

3. Critical Accounting Judgements and Estimates

Determining the carrying amount of some assets and liabilities and amounts recognised as reported profit requires judgement and/or estimation of the effect of uncertain future events. The major sources of judgement and estimation uncertainty that have a significant risk of resulting in a material adjustment to the carrying amounts of assets and liabilities and amounts recognised as reported profit are noted below. All other accounting policies are included within the respective Notes to the financial statements.

3.1 Separately reported items (Judgement)

In accordance with IAS 1, the Group has adopted a policy of disclosing separately on the face of its Group Income Statement, within the column entitled 'Separately reported items', the effect of any components of financial performance for which the Directors consider separate disclosure would assist both in a useful understanding of the financial performance achieved for a given year and in making projections of future results. Both materiality and the nature of the components of income and expense are considered in deciding upon such presentation. Such items may include, inter alia, the financial effect of exceptional items which occur infrequently, such as major restructuring activity, and items reported separately for consistency, such as amortisation charges relating to acquired intangible assets, profits or losses arising on the disposal of continuing or discontinued operations and the taxation impact of the aforementioned exceptional items and other items reported separately.

3.2 Provisions (Judgement and Estimate)

Vesuvius has extensive international operations and is subject to various legal and regulatory regimes, including those covering taxation and environmental matters. Several of the Group's subsidiaries are parties to legacy matter legal proceedings, certain of which are insured claims arising in the ordinary course of the operations of the company involved. Provisions are made for the expected amounts payable in respect of known or probable costs resulting both from legal claims or other regulatory requirements or from third-party claims, as described in Note 30. As the settlement of many of the potential obligations for which provision is made is subject to legal or other regulatory process, it requires estimation of the timing, quantum and amount of associated outflows, which are subject to some uncertainty. The Directors use their judgement and experience, including judgement as to whether to recognise a provision, to make appropriate estimates of provisions in the financial statements for amounts relating to such matters. Associated assets for insurance recoverable are subject to the same estimation uncertainty as their quantum varies in line with the expected provision. A critical judgement involves assessing likelihood of insurance being paid which considers available cover and historical evidence to determine this is virtually certain.

3.3 Current tax (Judgement and Estimate)

Tax credits and assets are not recognised unless it is probable that they will result in future economic benefits to the Group. In assessing the amount of the benefit to be recognised in the financial statements, the Directors exercise their judgement in considering the effect of negotiations, litigation and any other matters that they consider may impact upon the potential settlement. The Group operates internationally and is subject to tax in many different jurisdictions. As a consequence, the Group is routinely subject to tax audits and local enquiries which, by their very nature, can take a considerable period of time to conclude. Provisions are made for known issues based on all substantively enacted legislation, the Directors' interpretation of country-specific tax law and their assessment of the likely outcome, taking into consideration the Group's experience in agreeing tax liabilities with tax authorities and appropriate external advice. These require estimation of quantum. As indicated in Note 10.5, provisions for uncertain tax positions amount to £11.8m at the end of 2019 (2018: £20.2m). The provisions represent the maximum estimated amount of tax that would be payable by the Group should the tax authorities disagree with the positions taken in the submitted tax returns. Further discussion of these provisions is contained in that Note. All income tax liabilities, provisions and assets are treated as income tax payable and recoverable in accordance with IAS 12 and IFRIC 23.

3.4 Employee benefits (Estimate)

The Group's financial statements include the costs and obligations associated with the provision of pension and other post-retirement benefits to current and former employees. It is the Directors' responsibility to set the assumptions used in determining the key elements of the costs of meeting such future obligations. These assumptions are set after consultation with the Group's actuaries and include those used to determine regular service costs and the financing elements related to the plans' assets and liabilities. Whilst the Directors believe that the assumptions used are appropriate, a change in the assumptions could affect the Group's profit and financial position. The pension obligations are most sensitive to a change in the discount rate and therefore could materially change in the next financial year if the discount rate changes significantly. Sensitivity disclosures are included in Note 26.3.

3.5 Impairment testing of intangible assets (Estimate)

Determining whether intangible assets are impaired requires an estimation of the value-in-use of the cash-generating units to which these assets have been allocated. The value-in-use calculation requires estimation of future cash flows expected to arise for the cash-generating unit, the selection of suitable discount rates and the estimation of long-term growth rates. As determining such assumptions is inherently uncertain and subject to future factors, there is the potential these may differ in subsequent periods and therefore materially change the conclusions reached. In light of this, consideration is made each year as to whether sensitivity disclosures are required for reasonably possible changes to assumptions.

4. Alternative Performance Measures

The Company uses a number of alternative performance measures (APMs) in addition to those reported in accordance with IFRS. The Directors believe that these APMs, listed below, are important when assessing the underlying financial and operating performance of the Group and its divisions, providing management with key insights and metrics in support of the ongoing management of the Group's performance and cash flow. A number of these align with key performance measures (KPIs) and other key metrics used in the business and therefore are considered useful to also disclose to the users of the financial statements. The following APMs do not have standardised meaning prescribed by IFRS as adopted by the EU and therefore may not be directly comparable with similar measures presented by other companies.

4.1 Headline

Headline performance, reported separately on the face of the Group Income Statement, is from continuing operations and before items reported separately on the face of the Group Income Statement.

4.2 Underlying revenue, underlying trading profit and underlying return on sales

Underlying revenue, underlying trading profit and underlying return on sales are the headline equivalents of these measures after adjustments to exclude the effects of changes in exchange rates, business acquisitions and disposals. Reconciliations of underlying revenue and underlying trading profit can be found in the Financial Review. Underlying revenue growth is one of the Group's KPIs and provides an important measure of organic growth of Group businesses between reporting periods, by eliminating the impact of exchange rates, acquisitions, disposals and significant business closures.

4.3 Return on sales (ROS)

ROS is calculated as trading profit divided by revenue. It is one of the Group's KPIs and is used to assess the trading performance of Group businesses. A reconciliation of ROS is included in Note 5.3.

4.4 Trading profit/EBITA

Trading profit/EBITA, reported separately on the face of the Group Income Statement, is defined as operating profit before separately reported items. It is one of the Group's KPIs and is used to assess the trading performance of Group businesses. It is also used as one of the targets against which the annual bonuses of certain employees are measured.

4.5 Headline profit before tax

Headline profit before tax, reported separately on the face of the Group Income Statement, is calculated as the net total of trading profit, plus the Group's share of post-tax profit of joint ventures and total net finance costs associated with headline performance. It is one of the Group's KPIs and is used to assess the financial performance of the Group as a whole.

4.6 Effective tax rate (ETR)

The Group's ETR is calculated on the income tax costs associated with headline performance, divided by headline profit before tax and before the Group's share of post-tax profit of joint ventures.

4.7 Headline earnings per share

Headline earnings per share is calculated by dividing headline profit before tax less associated income tax costs, attributable to owners of the parent by the weighted average number of ordinary shares in issue during the year. It is one of the Group's key performance indicators and is used to assess the underlying earnings performance of the Group as a whole. It is also used as one of the targets against which the annual bonuses of certain employees are measured. Headline earnings per share is disclosed in Note 11.

4.8 Adjusted operating cash flow

Adjusted operating cash flow is cash generated from continuing operations before restructuring and net retirement benefit obligations but after deducting capital expenditure net of asset disposals. It is used in calculating the Group's cash conversion.

Adjusted operating cash flow and cash conversion

	2019 £m	2018 £m
Cash generated from continuing operations (Note 12)	240.7	195.3
Add: Outflows relating to restructuring charges	30.0	19.3
Add: Net retirement benefit obligations	5.1	3.4
Less: Capital expenditure	(65.4)	(41.2)
Add: Vacant site remediation costs	1.8	—
Add: Proceeds from the sale of property, plant and equipment	3.7	2.6
Add: Proceeds from the sale of assets classified as held for sale	1.8	—
Adjusted operating cash flow	217.7	179.4
Trading profit	181.4	197.2
Cash conversion	120%	91%

Excluding IFRS 16, cash conversion for 2019 is 113%.

Notes to the Group Financial Statements continued

4. Alternative Performance Measures continued

4.9 Cash conversion

Cash conversion is calculated as adjusted operating cash flow from continuing operations divided by trading profit. It is useful for measuring the rate at which cash is generated from trading profit. It is also used as one of the targets against which the annual bonuses of certain employees are measured. The calculation of cash conversion is detailed in the Financial Review.

4.10 Free cash flow

Free cash flow is defined as net cash flow from operating activities after net outlays for the purchase and sale of property, plant and equipment, dividends from joint ventures and dividends paid to non-controlling shareholders, but before additional funding contributions to Group pension plans. It is one of the Group's KPIs and is used to assess the underlying cash generation of the Group and is one of the measures used in monitoring the Group's capital. A reconciliation of free cash flow is included underneath the Group Statement of Cash Flows.

4.11 Average trade working capital to sales ratio

The average trade working capital to sales ratio is calculated as the percentage of average trade working capital balances to the total revenue for the year. Average trade working capital (comprising inventories, trade receivables and trade payables) is calculated as the average of the 12 previous month-end balances. It is one of the Group's key performance indicators and is useful for measuring the level of working capital used in the business and is one of the measures used in monitoring the Group's capital.

	2019	2018
Average trade working capital	410.2	429.3
Total revenue	1,710.4	1,798.0
Average trade working capital to sales ratio	24.0%	23.9%

4.12 Earnings before interest, tax, depreciation and amortisation (EBITDA)

EBITDA is calculated as the total of trading profit before depreciation and amortisation of non-acquired intangible assets. It is used in the calculation of the Group's interest cover and net debt to EBITDA ratios. A reconciliation of EBITDA is included in Note 5.

4.13 Net interest

Net interest is calculated as interest payable on borrowings less interest receivable, excluding any item separately reported. It is used in the calculation of the Group's interest cover ratio.

4.14 Interest cover

Interest cover is the ratio of EBITDA to net interest. It is one of the Group's KPIs and is used to assess the financial position of the Group and its ability to fund future growth. This measure is also a component of the Group's covenant calculations.

4.15 Net debt

Net debt comprises the net total of cash and short-term deposits, current and non-current interest-bearing borrowings and derivative financial instruments. Net debt is a measure of the Group's net indebtedness to banks and other external financial institutions. A reconciliation of the movement in net debt is included in Note 14.

4.16 Net debt to EBITDA

Net debt to EBITDA is the ratio of net debt at the year-end to EBITDA for that year. It is one of the Group's KPIs and is used to assess the financial position of the Group and its ability to fund future growth and is one of the measures used in monitoring the Group's capital.

4.17 Return on net assets (RONA)

RONA is calculated as trading profit plus share of post-tax profit of joint ventures, divided by average net operating assets (being the average over the previous 12 months of property, plant and equipment, trade working capital, interests in joint ventures and associates, investments and other operating receivables, payables and provisions, translated at average exchange rates for the year). It is one of the Group's KPIs and is used to assess the financial performance and asset management of the Group and is one of the measures used in monitoring the Group's capital.

	2019	2018
Average net operating assets	690.2	658.9
Trading profit	181.4	197.2
Share of post-tax profit from joint ventures	1.0	2.8
	182.4	200.0
RONA	26.4%	30.4%

4.18 Constant currency

Constant currency is the average 2019 exchange rates.

5. Segment Information

The segment information contained in this Note refers to several alternative performance measures, definitions of which can be found in Note 4.

5.1 Business segments

Operating segments for continuing operations

The Group's operating segments are determined taking into consideration how the Group's components are reported to the Executive Directors of the Board, who make the key operating decisions and are responsible for allocating resources and assessing performance of the component. Taking into account the Group's management and internal reporting structure, the operating segments are Steel Flow Control, Steel Advanced Refractories, Steel Digital Services (Sensors & Probes) and the Foundry Division. The principal activities of each of these segments are described in the Strategic Report.

Steel Flow Control, Steel Advanced Refractories and Steel Digital Services (Sensors & Probes) operating segments are aggregated into the Steel reportable segment. In determining that aggregation is appropriate, judgement is applied which takes into account the economic characteristics of these operating segments which include a similar nature of products, customers, production processes and margins.

Segment revenue represents revenue from external customers (inter-segment revenue is not material). Trading profit includes items directly attributable to a segment as well as those items that can be allocated on a reasonable basis.

5.2 Accounting policy – revenue recognition

Revenue comprises the fair value of the consideration received or receivable for goods supplied and services rendered to customers after deducting rebates, discounts and value-added taxes, and after eliminating sales within the Group. Revenue from contracts with customers is recognised when control of the goods or services is transferred to the customer, upon the completion of specified performance obligations, at an amount that reflects the considerations to which the Group expects to be entitled in exchange for these consumable products and associated services.

The identification of performance obligations includes a determination of whether the goods or services (or bundle of goods or services) are distinct. Where contracts contain the provision of multiple elements such as refractory consumables, technical assistance and equipment, management applies judgement in determining whether the customer benefits from the combined output of promises in the contract, in which case the individual elements are not distinct and should be bundled.

The transaction price is allocated to each performance obligation based on the relative standalone selling prices of the goods or services provided. If a standalone selling price is not available, the Group will estimate the selling price with reference to the price that would be charged for the goods or services if they were sold separately.

An assessment of the timing of revenue recognition is made for each performance obligation. Approximately 87% (2018:89%) of our revenue relates to the sale of consumables and systems for which revenue is recognised at a point in time when the customer takes ownership. Revenue is recognised at a point in time for all standard revenue transactions when control of the goods provided is transferred to the customer. In addition, approximately 13% (2018: 11%) of revenue is also recognised at a point in time for contracts which contain multiple elements ('service contracts'), when the performance obligation has been satisfied. For service contracts, the customer benefits from the combination of goods and services into a single product and performance obligations are satisfied when the customer has produced an agreed amount of steel over a certain period. The Group recognises revenue over time for contracts which contain performance obligations that are longer term in nature. Where the contract deliverable is based on the progress of the goods and services being transferred to the customer, the output method of completion is used, whereas the input method, which looks at the resources used to date to deliver the performance obligation, is used where there is a direct link between resources used and the transfer of control of goods and services. For fixed-price contracts, the customer will pay the amounts as agreed in the payment schedule and contract asset or liability balances are recognised in accordance with the timing of completion of the identified performance obligations.

Notes to the Group Financial Statements continued

5 Segment Information continued

Revenue from contracts with customers

Performance obligations

The Group enters into contracts to provide one or multiple items to customers in the Global steel and foundry industries. Management applies judgement in determining the number of performance obligations that apply to each contract. Information about the Group's performance obligations is summarised below.

Where the Group provides consumable items only to the Global steel and foundry industries, one performance obligation is present. The performance obligation to deliver consumables to the customer is satisfied upon delivery of these items. Following the satisfaction of the performance obligation, an invoice is raised and payment is due within the timeframe as noted on the invoice. Revenue is recognised at a point in time.

The Group also enters into contracts with customers in the Global steel industry primarily to provide consumable items to facilitate the steel production process. These contracts often include the supply of equipment and/or technical assistance. The Group applies judgement in determining the number of performance obligations in each contract and invoices are raised in accordance with contractual terms with payment due within the timeframe as noted on the invoice. Revenue is primarily recognised at a point in time unless there are specific performance obligations to deliver other services. Revenue related to these other services may be recognised over time.

Revenue is also earned from the installation of product or equipment at customer sites. The Group applies judgement in determining the number of performance obligations in each contract and invoices are raised in accordance with contractual terms with payment due within the timeframe as noted on the invoice or as agreed on a payment schedule. Revenue is recognised over time by measuring the progress of completion of each performance obligation.

Variable consideration

> Rights of return

Certain contracts provide a customer with a right to return goods within a specific period. The Group estimates the amount of consideration to which it will be entitled in exchange for transferring the goods or services to the customer, using Management's expertise within the business, and recognises a separate liability representing the estimated amount of consideration that an entity does not expect to receive as it will be refunded to the customer.

Contract balances

> Contract assets

A contract asset is a right to payment in exchange for goods or services that have been transferred to a customer when that right is conditional on something other than the passage of time.

> Receivable

A receivable is a company's right to payment that is unconditional. A right to consideration is unconditional if only the passage of time is required before payment of that consideration is due. Once the consideration due to the Group is "unconditional", the contract asset should be reclassified as a receivable.

> Contract liability

A contract liability is an obligation to transfer goods or services to a customer for which the consideration has been received (or an amount of consideration is due) from the customer.

The following table provides information about receivables, contract assets and contract liabilities from contracts with customers.

	2019 £m	2018 £m
Receivables, which are included in 'Trade and other receivables'	306.7	372.7
Contract assets, which are included in 'Trade and other receivables'	1.1	0.8
Contract liabilities, which are included in 'Trade and other payables'	3.3	2.6

Contract liabilities of £3.3m (2018: £2.6m) include advances received from a customer that precede the satisfaction of performance obligations by the Group. The increase in contract liabilities in the year is attributed to an increase in the number of customers making advance payments and an overall increase in contract activity. £2.6m of the contract liabilities recognised in the prior year was recognised as revenue in 2019.

Where the period between the transfer of the promised goods or services to the customer and payment by the customer is less than one year, the Group does not adjust any of these transaction prices for the time value of money. Balances where the collection date is more than one year from the balance sheet date are adjusted for the time value of money.

The Group applies the practical expedient in paragraph 121 of IFRS 15 and does not disclose information about remaining performance obligations that have original expected durations of one year or less.

5.3 Segmental analysis

The reportable segment results from continuing operations for 2019 and 2018 are presented below.

	2019					
	Flow Control £m	Advanced Refractories £m	Digital Services (Sensors & Probes) £m	Total Steel £m	Foundry £m	Total £m
Segment revenue	626.3	539.8	29.2	1,195.3	515.1	1,710.4
at a point in time				1,188.9	515.1	1,704.0
over time				6.4		6.4
Segment EBITDA				153.4	77.7	231.1
Segment depreciation				(33.3)	(16.4)	(49.7)
Segment trading profit				120.1	61.3	181.4
Return on sales margin				10.0%	11.9%	10.6%
Amortisation of acquired intangible assets						(10.0)
Restructuring charges						(39.8)
Vacant site remediation costs						(4.1)
Operating profit						127.5
Net finance costs						(11.0)
Share of post-tax profit of joint ventures						2.1
Profit before tax						118.6
Capital expenditure additions				53.6	21.1	74.7

	2018					
	Flow Control £m	Advanced Refractories £m	Digital Services (Sensors & Probes) £m	Total Steel £m	Foundry £m	Total £m
Segment revenue	662.6	541.1	33.0	1,236.7	561.3	1,798.0
at a point in time				1,225.7	561.3	1,787.0
over time				11.0	—	11.0
Segment EBITDA				155.3	82.9	238.2
Segment depreciation				(27.0)	(14.0)	(41.0)
Segment trading profit				128.3	68.9	197.2
Return on sales margin				10.4%	12.3%	11.0%
Amortisation of acquired intangible assets						(12.9)
Restructuring charges						(15.3)
GMP equalisation charge						(4.5)
Operating profit						164.5
Net finance costs						(11.1)
Share of post-tax profit of joint ventures						2.8
Profit before tax						156.2
Capital expenditure additions				34.4	14.0	48.4

The Chief Operating Decision Maker does not review non-current assets at a segmental level so these disclosures are not included.

Notes to the Group Financial Statements continued

5. Segment Information continued

5.4 Geographical analysis

	External revenue		Non-current assets	
	2019 £m	2018 £m	2019 £m	2018 £m
EMEA	699.8	786.4	478.0	468.5
Asia	480.4	484.6	227.3	250.1
North America ⁽¹⁾	419.0	407.6	345.7	325.0
South America	111.2	119.4	58.3	62.0
Continuing operations	1710.4	1,798.0	1,109.3	1,105.6

1. CCPI has contributed £23.8m of revenue to North America since acquisition on 1 March 2019. See Note 20.

External revenue disclosed in the table above is based upon the geographical location of the operation. Non-current assets exclude employee benefits net surpluses and deferred tax assets. Information relating to the Group's products and services is given in the Strategic Report. The Group is not dependent on any single customer for its revenue and no single customer, for either of the years presented in the table above, accounts for more than 10% of the Group's total external revenue.

6. Operating profit

6.1 Operating profit is stated after charging

	2019 £m	2018 £m
Cost of inventories recognised as an expense (Note 19)	642.6	677.4
Research and development	29.1	33.6
Employee expenses (Note 8)	395.0	414.3
Depreciation (Note 15)	49.7	41.0
Amortisation (Note 16)	10.0	12.9
Operating lease charges (Note 29)	6.0	20.9

6.2 Amounts payable to PricewaterhouseCoopers LLP and their Associates

	2019 £m	2018 £m
Fees payable to the Company's auditors and their associates for the audit of the parent Company and Consolidated Financial Statements	0.5	0.5
Fees payable to the Company's auditors and their associates for other services:		
Audit of the Company's subsidiaries ⁽¹⁾	1.2	1.1
Audit-related assurance services	0.1	0.1
Total auditors' remuneration	1.8	1.7

1. After the reporting period end date, the Group incurred £0.2m in additional audit fees due for the 2018 year-end audit.

Total auditors' remuneration of £1.8m in 2019 all related to continuing operations, of which £1.7m related to audit fees and £0.1m of non-audit fees, in respect of the Group's half-year financial statements, quarterly reviews and tax form audits in India (as required by regulation) (2018: £1.7m, including £1.6m of audit fees and £0.1m of non-audit fees, the latter in respect of the half year review fee and quarterly reviews, and tax form audits in India). It is the Group's policy not to use the Group's auditors for non-audit services other than for audit related services that are required to be performed by an auditor.

Mazars LLP acts as external auditor of the non-material entities within the Group. Total remuneration for the audit of the non-material entities was £0.5m (2018: £0.5m). This amount is not included in the table above.

7. Restructuring Charges

As explained in the Financial review on page 41, the 2019 restructuring charges were £39.8m and relate to the programme first announced in March 2018, which is predominantly focused on rationalising our manufacturing footprint, consolidating production and streamlining various back office functions. The charges reflect redundancy costs of £24.8m (2018: £8.3m), plant closure costs of £4.4m (2018: £4.7m), consultancy fees of £1.6m (2018: £0.5m), asset write-offs of £8.9m (2018: £1.7m) and travel of £0.1m (2018: £0.1m).

The net tax credit attributable to the total restructuring charges was £9.2m (2018: £1.8m).

Cash costs of £30.0m (2018: £19.3m) (Note 12) were incurred in the year in respect of the restructuring programme, leaving provisions made but unspent of £19.1m (Note 30) as at 31 December 2019 (2018: £17.4m), of which £nil (2018: £4.3m) relates to future costs in respect of leases expiring between one and six years.

8. Employees

8.1 Employee expenses

	2019 £m	2018 £m
Wages and salaries	323.4	340.0
Social security costs	50.6	54.0
Share-based payments (Note 27)	4.9	3.7
Pension costs — defined contribution pension plans (Note 26)	11.3	11.4
— defined benefit pension plans (Note 26)	4.3	4.6
Other post-retirement benefits (Note 26)	0.5	0.6
Total employee expenses	395.0	414.3

8.2 Monthly average number of employees

	2019 no.	2018 no.
Steel	7,731	7,894
Foundry	2,845	3,126
Continuing operations	10,576	11,020
Discontinued operations	—	—
Total monthly average number of employees	10,576	11,020

As at 31 December 2019, the Group had 10,496 employees (2018: 10,809).

8.3 Remuneration of key management personnel

The remuneration of the Directors, who are the key management personnel of the Group, is set out below in aggregate for each of the categories specified in IAS 24 Related Party Disclosures. Further information about the remuneration of individual Directors is provided in the audited part of the Directors' Remuneration Report on pages 114 to 125.

	2019 £m	2018 £m
Short-term employee benefits	1.2	2.0
Post-employment benefits	0.2	0.2
Share-based payments	1.2	0.8
Total remuneration of key management personnel	2.6	3.0

9. Net Finance Costs

	2019 £m	2018 £m
Interest payable on borrowings		
Loans and overdrafts	15.7	14.5
Interest on lease liabilities	1.6	0.2
Amortisation of capitalised arrangement fees	0.6	0.6
Total interest payable on borrowings	17.9	15.3
Interest on net retirement benefit obligations	0.3	0.1
Adjustment to discounts on provisions and other liabilities	1.3	1.3
Adjustment to discounts on receivables	(0.7)	(0.8)
Finance income	(7.8)	(4.8)
Total net finance costs	11.0	11.1

Notes to the Group Financial Statements continued

10. Income Tax

10.1 Accounting policy

Tax expense represents the sum of current tax and deferred tax. Current and deferred tax are recognised in profit or loss except to the extent that they relate to items charged or credited in the Group Statement of Comprehensive Income or Group Statement of Changes in Equity, in which case the associated tax is also recognised in those statements.

In arriving at its current tax charge, the Group also makes careful assessment of the likely impact of tax law changes, such as the recently announced corporate tax rate reduction in India.

Current tax

Current tax is based on taxable profit for the year. Taxable profit differs from profit before tax as reported in the Group Income Statement because it excludes items of income or expense that are taxable or deductible in other years and it further excludes items that are never taxable or deductible. The Group's liability for current tax is calculated using tax rates and laws that have been enacted, or substantively enacted, by the balance sheet date.

A provision is recognised when the Group considers it has a present tax obligation as the result of a past event and it is probable that the Group will be required to settle that obligation. Provisions established for such uncertain tax positions are made using a best estimate of the tax expected to be paid, based on a qualitative and quantitative assessment of all relevant information. Such a provision is typically required where the underlying tax issue is subject to interpretation and remains to be agreed, and therefore is uncertain as to outcome. Principally the uncertain tax positions for which a provision is made relate to the interpretation of tax legislation and guidance regarding transfer pricing arrangements that have been entered into in the normal course of business. In accordance with IAS 12, tax provisions are included as income tax payable on the face of the Group Balance Sheet, and movements in tax provisions are included within income tax charges or credits in the Group Income Statement.

In assessing any appropriate provision requirements for uncertain tax items, the Group considers progress made in discussions with the tax authorities, expert advice on the likely outcome and any recent developments in case law. Due to the uncertainty associated with such tax items, it is possible that at a future date, on conclusion of the open matters, the final outcome may vary materially. Any such variations will affect the financial results in the year in which such a determination is made.

IFRIC 23 Uncertainty over Income Tax Treatments is effective from 1 January 2019. It clarifies how to recognise and measure deferred and current income tax assets and liabilities where there is uncertainty over tax treatment under IAS 12.

Deferred tax

Deferred tax is recognised on differences between the carrying amounts of assets and liabilities in the financial statements and the corresponding tax bases used in the computation of taxable profit and is accounted for using the balance sheet liability method. Deferred tax liabilities are generally recognised for all taxable temporary differences and deferred tax assets are recognised to the extent that it is probable that taxable profits will be available against which deductible temporary differences can be utilised. Such assets and liabilities are not recognised if the temporary difference arises from the initial recognition of goodwill or from the initial recognition (other than in a business combination) of other assets and liabilities in a transaction that affects neither the taxable profit nor the accounting profit. Deferred tax is calculated at the tax rates that are expected to apply in the period when the liability is settled or the asset is realised, based on tax rates and laws that have been enacted, or substantively enacted, by the balance sheet date.

Deferred tax liabilities are recognised for taxable temporary differences arising on investments in subsidiaries and interests in joint ventures, except where the Group is able to control the reversal of the temporary difference and it is probable that the temporary difference will not reverse in the foreseeable future. The carrying amount of deferred tax assets is reviewed at each balance sheet date and reduced to the extent that it is no longer probable that sufficient taxable profits will be available to allow all or part of the asset to be recovered. Deferred tax assets and liabilities are offset when there is a legally enforceable right to set off current tax assets against current tax liabilities and when they relate to income taxes levied by the same taxation authority and the Group intends to settle its current tax assets and liabilities on a net basis.

10.2 Income tax charge

	2019 £m	2018 £m
Current tax		
Overseas taxation	32.2	41.9
Adjustments in respect of prior years	(1.1)	(3.0)
Total current tax, continuing operations	31.1	38.9
Deferred tax		
Origination and reversal of temporary taxable differences	1.7	(28.6)
Adjustments in respect of prior years	(0.7)	1.3
Total deferred tax, continuing operations	1.0	(27.3)
Total income tax charge	32.1	11.6
Total income tax charge attributable to:		
Continuing operations — headline performance	43.8	48.4
— separately reported	(11.7)	(36.8)
Total income tax charge	32.1	11.6

Included in the Group's total income tax charge are charges and credits meeting the criteria set out in Note 2.5 to be treated as separately reported items, as analysed in the following table:

	2019 £m	2018 £m
Separately reported items		
Restructuring charges	(9.2)	(1.8)
Amortisation and utilisation of acquired intangibles	(2.5)	(2.8)
Additional recognition of US deferred tax asset	—	(32.2)
Total tax charge/(credit) separately reported	(11.7)	(36.8)

In 2018, the Group substantially increased the deferred tax recognised on its balance sheet in respect of its US tax losses and other temporary differences. The substantial part of that additional recognition is reflected in separately reported items in the Group Income Statement, the rest being reflected in the Group Statement of Comprehensive Income (relating to pension costs reflected in that statement). In addition, the Group presents (in 2018 and 2019) the normal utilisation of that asset in offsetting the Group's US taxable headline profits as part of its headline tax charge, to the extent it does not relate to deferred tax which was initially recognised in the Group Statement of Comprehensive Income.

The impact of the Global Intangible Low-Taxed Income ('GILTI') provisions in the US on Vesuvius in 2019 has been to increase the headline tax charge by £1.2m (2018: £2.4m).

During 2019, India confirmed a reduction in its corporate income tax rate from 1 April 2019 to approximately 25%. This has reduced the effective rate of tax on headline profit before tax and before the Group's share of post-tax profits from joint ventures by 1.4%.

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

The Group operates in a number of countries that have differing tax rates, laws and practices. Changes in any of these areas could, adversely or positively, impact the Group's tax charge in the future. Continuing losses, or insufficiency of taxable profit to absorb all expenses, in any subsidiary, could have the effect of increasing tax charges in the future as effective tax relief may not be available for those losses or expenses. Other significant factors affecting the tax charge are described in Notes 2.5, 3.3, 10.1 and 10.6.

Notes to the Group Financial Statements continued

10. Income Tax continued

10.3 Reconciliation of income tax charge to profit before tax

	2019 £m	2018 £m
Profit before tax	118.6	156.2
Tax at the UK corporation tax rate of 19.0% (2018: 19.0%)	22.5	29.7
Overseas tax rate differences	5.1	11.1
Withholding taxes	5.4	5.0
Amortisation of intangibles	(0.8)	(0.3)
Expenses not deductible for tax purposes	2.1	1.3
Income taxed in advance	1.2	2.4
Deferred tax asset not previously recognised – US	–	(32.2)
Deferred tax asset not previously recognised – Other	(0.9)	(1.2)
Deferred tax assets not recognised	3.0	–
Utilisation of previously unrecognised tax losses	(3.7)	(2.5)
Adjustments in respect of prior years	(1.8)	(1.7)
Total income tax charge	32.1	11.6

10.4 Deferred tax

	Interest £m	Other operating losses £m	Pension costs £m	Intangible assets £m	Other temporary differences £m	Total £m
As at 1 January 2018	9.9	17.1	—	(23.1)	14.4	18.3
Exchange adjustments/other	1.6	1.0	0.5	(0.1)	1.2	4.2
Other net (charge)/credit charge to Group Statement of Comprehensive Income	—	—	6.0	—	—	6.0
Other net (charge)/credit to Group Income Statement	—	1.0	0.3	2.8	(1.1)	3.0
Other net (charge)/credit to Group Income Statement US	23.2	0.4	(3.4)	(1.5)	5.6	24.3
As at 1 January 2019	34.7	19.5	3.4	(21.9)	20.1	55.8
Exchange adjustments/other	(0.3)	(0.2)	(1.2)	0.8	(1.8)	(2.7)
Acquisition	—	—	—	(3.4)	0.6	(2.8)
Other net (charge)/credit charge to Group Statement of Comprehensive Income	—	—	1.9	—	—	1.9
Other net (charge)/credit to Group Income Statement	—	4.0	(0.7)	2.5	(3.0)	2.8
Other net (charge)/credit to Group Income Statement US	(10.5)	(4.5)	0.1	(0.4)	11.6	(3.7)
As at 31 December 2019	23.9	18.8	3.5	(22.4)	27.5	51.3

	2019 £m	2018 £m
Recognised in the Group Balance Sheet as:		
Non-current deferred tax assets	94.9	94.5
Non-current deferred tax liabilities	(43.6)	(38.7)
Net total deferred tax assets	51.3	55.8

Included in these deferred tax assets and liabilities are amounts to be expected to be utilised in 2020 as follows:

	2019 £m	2018 £m
Deferred tax assets	10.8	14.7
Deferred tax liabilities	(2.5)	(2.8)

Included in non-current deferred tax assets is £61.3m (2018: £67.3m) in respect of the partial recognition of temporary differences arising in the US computed in accordance with the policy set out in Note 10.1 above. The Group remains confident of the recovery of this asset. £19.5m (2018: £18.7m) remains unrecognised.

The Directors consider that the separate identification of deferred tax for material temporary differences in this manner assists both in a better understanding of the financial performance achieved, and in making projections of future results of the Group.

Tax loss carry-forwards and other temporary differences with a tax value of £nil (2018: £nil) were recognised by subsidiaries reporting a loss. Based on approved business plans of these subsidiaries, the Directors consider it probable that the tax loss carry-forwards and temporary differences cannot be offset against future taxable profits of these subsidiaries.

The total deferred tax assets not recognised as at 31 December 2019 were £167.8m (2018: £166.9m), as analysed below. In accordance with the accounting policy in Note 10.1, these items have not been recognised as deferred tax assets on the basis that their future economic benefit is not probable. In total, there was an increase of £0.9m (2018: £53.0m decrease) in net unrecognised deferred tax assets during the year.

	2019 £m	2018 £m
Operating losses (further described below)	95.6	97.1
Unrelieved US interest (may be carried forward indefinitely)	19.5	11.9
Capital losses available to offset future UK capital gains (may be carried forward indefinitely)	32.1	28.1
UK ACT credits (may be carried forward indefinitely)	13.1	13.1
US tax credits	—	6.8
Other temporary differences	7.5	9.9
Total deferred tax assets not recognised	167.8	166.9

The Group has significant net operating losses with a tax value of £114.4m (2018: £116.6m), only £18.8m (2018: £19.5m) of which meet the criteria set out in Note 10.1 to be recognised on the Group Balance Sheet.

	Operating losses recognised 2019 £m	Operating losses not recognised 2019 £m	Total 2019 £m	Operating losses recognised 2018 £m	Operating losses not recognised 2018 £m	Total 2018 £m
UK (may be carried forward indefinitely)	—	74.6	74.6	—	74.6	74.6
US (due to expire 2024-2031)	9.7	—	9.7	14.5	—	14.5
ROW (may be carried forward indefinitely)	9.1	21.0	30.1	4.9	20.8	25.7
ROW (due to expire within 5 years)	—	—	—	0.1	1.7	1.8
	18.8	95.6	114.4	19.5	97.1	116.6

The £30.1m (2018: £27.5m) operating losses available to set against future income in the rest of the world arise in a number of countries, reflecting the spread of the Group's operations.

As at 31 December 2018, the Group had unrecognised US tax credits with a value of £6.8m. The Group expects to utilise these credits in full prior to their expiration in 2024 so has now recognised the total amount of £12.4m on its balance sheet.

An amount of £3.1m has been recognised in respect of withholding taxes that will be due on a repatriation of funds from the group's Chinese subsidiaries.

Deferred tax is not recognised in respect of the value of the Group's investments in subsidiaries and interests in joint ventures where we are able to control the timing of the reversal of the temporary differences and it is probable that such differences will not reverse in the foreseeable future. The amount of these temporary differences for which deferred tax liabilities have not been recognised was £22.6m (2018: £25.2m).

UK corporation tax rate reductions to 17% from 1 April 2020 were enacted in 2016. Accordingly, the Group's closing UK deferred tax liability has been provided using a tax rate of 17% except where the reversals are expected to arise prior to 1 April 2020.

10.5 Income tax payable and recoverable

	2019 £m	2018 £m
Liabilities for income tax payable	2.5	9.1
Provisions for uncertain tax positions	11.8	20.2
	14.3	29.3
Income tax recoverable within one year	2.9	2.8
Income tax recoverable after more than one year	—	—
Total income tax recoverable	2.9	2.8
Net liability	11.4	26.5

Provisions for uncertain tax positions are calculated in accordance with the policy outlined in Note 10.1, and are treated as income tax payable in accordance with IAS 12.

These provisions cover litigated tax matters as well as provisions for other risks where the Group believes it is more likely than not that there would be a successful challenge by a tax authority to positions it has taken in its tax filings. By its nature, litigation can result in sharp fluctuations in cash flow, both in and out, relating to taxes. Currently, management do not expect any material adjustments to these provisions in 2020.

Notes to the Group Financial Statements continued

10. Income Tax continued

During the year the provisions for uncertain tax positions have reduced to £11.8m (2018: £20.2m). On adoption of IFRIC 23 the Group increased its retained earnings by £1.5m and reduced the brought forward balance for these provisions by an equivalent amount. The remaining decrease of £6.9m can be explained by the settlement of a tax audit in Switzerland (£4.1m) with a corresponding provision release (£1.4m) as well as the reassessment of potential uncertain tax positions following a lack of previously expected challenge by the tax authorities (£0.4m), the expiration of the statute of limitations on certain other exposures (£0.4m) and foreign exchange movements on the remaining balances (£0.6m).

10.6 Key factors impacting the sustainability of the effective tax rate are as follows:

Material changes in the geographic mix of profits

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 tax rate in the UK due to the availability of unutilised tax losses, and rates that lie somewhere in between.

Changes in tax rates, tax reform and its interpretation

Changes in tax rates and laws in the jurisdictions in which the Group operates could have a material effect on the Group's effective tax rate.

Availability of tax advantaged rates

Vesuvius in China qualifies for a tax advantaged rate of 15% (rather than the headline rate of 25%), on part of its profits due to the high technology nature of its business. Eligibility for this rate is reviewed on a regular basis by the Chinese tax authority and was worth approximately £1.5m in 2019 (2018: £1.6m). Without that benefit, the Group's effective tax rate on headline performance would have been 0.9% higher in 2019 (2018: 1.0%).

Resolution of tax judgements

At any one time, the Group can be subject to a number of challenges by tax authorities in the jurisdictions in which it operates. The outcome of these challenges is inherently uncertain, potentially resulting in a different tax charge from the amounts initially provided.

Impact of Brexit on Vesuvius' tax position

How Brexit impacts on the corporate income taxes position of Vesuvius will depend on the final terms of Brexit. It is not possible at this stage to provide precise guidance on how it will impact the Group as these exit terms remain unclear. Nevertheless, if the EU Parent Subsidiary and Interest and Royalty directives were no longer to apply to dividend, interest and other payments to Vesuvius in the UK, additional withholding taxes would become payable subject to reliefs available under applicable tax treaties.

11. Earnings per Share (EPS)

11.1 Earnings for EPS

Basic and diluted EPS from continuing operations are based upon the profit attributable to owners of the parent, as reported in the Group Income Statement, of £80.3m (2018: £137.8m), being the profit for the year of £86.5m (2018: £144.6m) less non-controlling interests of £6.2m (2018: £6.8m); basic and diluted EPS from total operations are based on the profit attributable to owners of the parent of £80.3m (2018: £138.3m); headline and diluted headline EPS are based upon headline profit from continuing operations attributable to owners of the parent of £121.4m (2018: £133.7m). The table below reconciles these different profit measures.

	Continuing operations £m	Discontinued operations £m	2019 total £m	Continuing operations £m	Discontinued operations £m	2018 total £m
Profit attributable to owners of the parent	80.3	—	80.3	137.8	0.5	138.3
Adjustments for separately reported items:						
Amortisation of acquired intangible assets	10.0			12.9		
Restructuring charges	39.8			15.3		
Gain on disposal of share in joint venture	(1.1)			—		
Vacant site remediation costs	4.1			—		
GMP equalisation charge	—			4.5		
Income tax (credit)/charge	(11.7)			(36.8)		
Headline profit attributable to owners of the parent	121.4			133.7		

11.2 Weighted average number of shares

	2019 millions	2018 millions
For calculating basic and headline EPS	269.1	269.8
Adjustment for potentially dilutive ordinary shares	1.9	1.4
For calculating diluted and diluted headline EPS	271.0	271.2

For the purposes of calculating diluted and diluted headline EPS, the weighted average number of ordinary shares is adjusted to include the weighted average number of ordinary shares that would be issued on the conversion of all potentially dilutive ordinary shares expected to vest, relating to the Company's share-based payment plans. Potential ordinary shares are only treated as dilutive when their conversion to ordinary shares would decrease EPS or increase loss per share.

11.3 Per share amounts

	Continuing operations pence	Discontinued operations pence	2019 total pence	Continuing operations pence	Discontinued operations pence	2018 total pence
Earnings per share — basic	29.8	—	29.8	51.1	0.2	51.3
— headline	45.1	—		49.6		
— diluted	29.6	—	29.6	50.8	0.2	51.0
— diluted headline	44.8	—		49.3		

12. Cash Generated from Operations

	Continuing operations £m	Discontinued operations £m	2019 total £m	Continuing operations £m	Discontinued operations £m	2018 total £m
Operating profit	127.5	—	127.5	164.5	0.5	165.0
Adjustments for:						
Amortisation of acquired intangible assets (Note 16)	10.0	—	10.0	12.9	—	12.9
Restructuring charges	39.8	—	39.8	15.3	—	15.3
Vacant site remediation costs	4.1	—	4.1	—	—	—
GMP equalisation charge	—	—	—	4.5	—	4.5
(Profit)/Loss on disposal of non-current assets	(0.3)	—	(0.3)	—	—	—
Depreciation	49.7	—	49.7	41.0	—	41.0
	230.8	—	230.8	238.2	0.5	238.7
Net decrease/(increase) in inventories	24.9	—	24.9	(20.7)	—	(20.7)
Net decrease/(increase) in trade receivables	54.4	—	54.4	(4.9)	—	(4.9)
Net (decrease)/increase in trade payables	(15.2)	—	(15.2)	3.6	—	3.6
Net (increase)/decrease in other working capital	(19.1)	—	(19.1)	1.8	(0.6)	1.2
Outflow related to restructuring charges	(30.0)	—	(30.0)	(19.3)	—	(19.3)
Net retirement benefit obligations	(5.1)	—	(5.1)	(3.4)	—	(3.4)
Cash generated from operations	240.7	—	240.7	195.3	(0.1)	195.2

13. Cash and Cash Equivalents**13.1 Accounting policy**

Cash and short-term deposits in the Group balance sheet consist of cash at bank, in hand and short term deposits with original maturity of three months or less. Bank overdrafts that are repayable on demand and form an integral part of the Group's cash management are included as a component of cash and cash equivalents for the purpose of the Group Statement of Cash Flows.

	2019 £m	2018 £m
Cash at bank and in hand	229.2	236.9
Cash and short-term deposits	229.2	236.9
Bank overdrafts	(7.1)	(23.5)
Cash and cash equivalents in the Group Statement of Cash Flows	222.1	213.4

Notes to the Group Financial Statements continued

14. Reconciliation of Movement in Net Debt

	Balance as at 1 Jan 2019 £m	Transition to IFRS 16 on 1 Jan 2019* £m	Foreign exchange adjustments £m	Non-cash movements £m	Cash flow £m	Balance as at 31 Dec 2019 £m
Cash and cash equivalents						
Cash at bank and in hand	236.9	—	(12.9)	—	5.2	229.2
Bank overdrafts	(23.5)	—	0.2	—	16.2	(7.1)
	213.4	—	(12.7)	—	21.4	222.1
Borrowings, excluding bank overdrafts						
Current	(6.5)	—	(8.1)	(105.5)	(44.5)	(164.6)
Non-current	(456.7)	(32.8)	29.1	96.3	59.7	(304.4)
	(463.2)	(32.8)	21.0	(9.2)	15.2	(469.0)
Capitalised arrangement fees	1.8	—	—	(0.6)	—	1.2
Derivative financial instruments	0.2	—	(5.4)	—	5.1	(0.1)
Net debt	(247.8)	(32.8)	2.9	(9.8)	41.7	(245.8)

	Balance as at 1 Jan 2018 £m	Foreign exchange adjustments £m	Non-cash movements £m	Cash flow £m	Balance as at 31 Dec 2018 £m
Cash and cash equivalents					
Cash at bank and in hand	161.9	0.5	—	74.5	236.9
Bank overdrafts	(21.9)	(0.4)	—	(1.2)	(23.5)
	140.0	0.1	—	73.3	213.4
Borrowings, excluding bank overdrafts					
Current	(4.3)	—	—	(2.2)	(6.5)
Non-current	(412.1)	(14.4)	—	(30.2)	(456.7)
	(416.4)	(14.4)	—	(32.4)	(463.2)
Capitalised borrowing costs	2.1	—	0.6	(0.9)	1.8
Derivative financial instruments	0.3	1.7	—	(1.8)	0.2
Net debt	(274.0)	(12.6)	0.6	38.2	(247.8)

Net debt is a measure of the Group's net indebtedness to banks and other external financial institutions and comprises the total of cash and short-term deposits, current and non-current interest-bearing borrowings and derivative financial instruments.

* The Group has adopted IFRS 16 leases from 1 January 2019 and, in accordance with the simplified approach, has not restated comparatives on transition. The reclassifications and adjustments arising from the new lease accounting rules are therefore recognised in the opening balance sheet on 1 January 2019 (please refer to Note 2.6).

15. Property, Plant and Equipment

15.1 Accounting policy

Freehold land and construction in progress are carried at cost less accumulated impairment losses. Other items of property, plant and equipment are carried at cost less accumulated depreciation and accumulated impairment losses. Costs are capitalised only when it is probable that they will result in future economic benefits flowing to the Group and when they can be measured reliably. Costs are capitalised to construction in progress where an asset is being developed. This is then transferred and depreciated when the asset is ready for use. All other repairs and maintenance expenditures are charged to the Group Income Statement in the period in which they are incurred.

On adoption of IFRS 16 Leases, right of use assets were recognised and assets accounted for previously under finance leases were reclassified into the right of use categories. Newly recognised right of use assets were measured at the amount equal to the lease liability, adjusted by the amount of any prepaid or accrued lease payments relating to that lease recognised in the balance sheet as at 31 December 2018.

Freehold land is not depreciated, as it has an infinite life. Depreciation on other items of property, plant and equipment begins when the asset is available for use and is charged to the Group Income Statement on a straight-line basis so as to write off the cost less residual value of the asset over its estimated useful life as follows:

Asset category	Estimated useful life
Freehold property	between 10 and 50 years
Leasehold property	the term of the lease
Right of use assets	shorter of the asset's useful life and lease term
Plant and equipment — motor vehicles and information technology equipment	between 1 and 5 years
— other	between 3 and 15 years

The depreciation method used, residual values and estimated useful lives are reviewed annually and changed, if appropriate. As described in Note 17.1, an asset's carrying amount is immediately written down to its recoverable amount if its carrying amount is greater than its estimated recoverable amount. Gains and losses arising on disposals are determined by comparing sales proceeds with carrying amount and are recognised in the Group Income Statement.

15.2 Movement in net book value

	Freehold property ⁽¹⁾ £m	Leasehold property £m	Right of use assets – land & buildings £m	Right of use assets – plant & equipment £m	Plant and equipment £m	Construction in progress £m	Total £m
Cost							
As at 1 January 2018	203.5	2.3	—	—	555.4	41.8	803.0
Exchange adjustments	3.4	(0.1)	—	—	4.9	(1.1)	7.1
Capital expenditure additions	2.0	0.1	—	—	20.2	26.1	48.4
Disposals	(1.2)	—	—	—	(24.8)	—	(26.0)
Assets classified as held for sale	(1.7)	—	—	—	—	—	(1.7)
Reclassifications	4.4	—	—	—	16.4	(20.8)	—
As at 1 January 2019	210.4	2.3	—	—	572.1	46.0	830.8
Impact of IFRS 16 adoption	—	—	22.3	11.3	—	—	33.6
Exchange adjustments	(10.7)	—	(0.7)	(0.8)	(28.4)	(2.9)	(43.5)
Capital expenditure additions ⁽²⁾	3.9	—	1.5	6.2	33.7	29.4	74.7
Acquisitions through business combinations	1.8	0.1	1.5	—	1.7	0.1	5.2
Disposals	(1.1)	—	—	(2.8)	(13.3)	(0.6)	(17.8)
Assets classified as held for sale	—	—	—	—	—	—	—
Reclassifications	16.8	—	—	8.7	(11.2)	(14.3)	—
As at 31 December 2019	221.1	2.4	24.6	22.6	554.6	57.7	883.0
Accumulated depreciation and impairment losses							
As at 1 January 2018 restated (Note 17.2)	91.4	1.8	—	—	408.7	—	501.9
Exchange adjustments	1.9	—	—	—	4.2	—	6.1
Depreciation charge	5.9	0.1	—	—	35.0	—	41.0
Impairment	0.3	—	—	—	0.3	—	0.6
Disposals	(0.6)	—	—	—	(21.9)	—	(22.5)
Reclassifications	(0.1)	(0.2)	—	—	0.3	—	—
As at 1 January 2019	98.8	1.7	—	—	426.6	—	527.1
Exchange adjustments	(4.8)	(0.1)	(0.1)	(0.3)	(20.8)	—	(26.1)
Depreciation charge	6.6	0.1	4.0	6.6	32.4	—	49.7
Impairment	1.7	—	—	—	5.8	—	7.5
Disposals	(0.2)	—	—	(1.7)	(11.0)	—	(12.9)
Reclassifications	7.4	—	—	4.3	(11.7)	—	—
As at 31 December 2019	109.5	1.7	3.9	8.9	421.3	—	545.3
Net book value as at 31 December 2019	111.6	0.7	20.7	13.7	133.3	57.7	337.7
Net book value as at 31 December 2018	111.6	0.6	—	—	145.5	46.0	303.7
Net book value as at 1 January 2018	112.1	0.5	—	—	146.7	41.8	301.1

(1) 2018 opening balances for cost and depreciation have been grossed up by £1.8m for identified fixed assets previously written off (£Nil net book value).

(2) The £29.4m for construction in progress additions at 31 December 2019 includes projects to increase production facilities in Mexico, Germany and Poland.

Capital expenditure on customer-installation assets was £7.8m (2018: £7.7m). The impairment charge of £7.5m (2018: £0.6m) is included within restructuring charges for asset write-offs in Note 7.

Notes to the Group Financial Statements continued

16. Intangible Assets

Intangible assets comprise goodwill and other intangible assets that have been acquired through business combinations.

16.1 Accounting policy

(a) Goodwill

Goodwill arising in a business combination is initially recognised as an asset at cost, measured as the excess of the aggregate of the acquisition-date fair value of the consideration transferred and the amount of any non-controlling interest acquired over the net of the acquisition-date fair value amounts of the identifiable assets acquired and liabilities assumed. When the excess is negative, a bargain purchase gain is recognised immediately in profit or loss. Goodwill is subsequently measured at cost less accumulated impairment losses, with impairment testing carried out annually, or more frequently when there is an indication that the cash-generating unit (CGU) to which the goodwill has been allocated may be impaired. On disposal of a business, the attributable amount of goodwill is included in the calculation of the profit or loss on disposal.

(b) Other intangible assets

Intangible assets other than goodwill are recognised on business combinations if they are separable, or if they arise from contractual or other legal rights, and their value can be measured reliably. They are initially measured at cost, which is equal to the acquisition-date fair value, and subsequently measured at cost less accumulated amortisation charges and accumulated impairment losses. Other intangible assets are subject to impairment testing when there is an indication that an impairment loss may have been incurred and are amortised over their estimated useful lives.

(c) Research and development costs

The Group's research activity involves long-range, 'blue sky' investigation, the findings from which may be used in the future to develop new or substantially improved products. Expenditure on research activities is recognised in the Group Income Statement as an expense in the year in which it is incurred.

Development is the application of research findings for the production of new or substantially improved products, processes and services before the start of commercial production. Development expenditure is capitalised only if the expenditure can be measured reliably, the product or process is technically and commercially feasible, future economic benefits are probable and the Group intends to and has sufficient resources to complete development and to use or sell the asset. Otherwise, it is recognised in the Group Income Statement as an expense in the year in which it is incurred. Capitalised development expenditure, where there is any, is stated at cost less accumulated amortisation and impairment losses.

In determining whether development expenditure is capitalised as an intangible asset, management considers whether the strict intangible asset recognition criteria set out in IAS 38, Intangible Assets, have been met at the time the expenditure is incurred. In making this determination, management recognise that a significant amount of the development expenditure undertaken by the Group is focused on dealing with local customer technical support issues and incremental developments to existing products as opposed to new or substantially improved products, and that at the time the feasibility of the project is determined a significant proportion of the development expenditure for that project has already been incurred. In 2019 and 2018 no projects met the criteria for IAS 38 capitalisation.

16.2 Movement in net book value

	Goodwill £m	Other intangible assets £m	2019 total £m	Goodwill Restated* £m	Other intangible assets £m	2018 Restated* total £m
Cost						
As at 1 January	637.1	271.5	908.6	625.8	271.2	897.0
Exchange adjustments	(28.4)	(6.1)	(34.5)	11.3	0.3	11.6
Business combinations (Note 20)	11.5	13.8	25.3	—	—	—
As at 31 December	620.2	279.2	899.4	637.1	271.5	908.6
Accumulated amortisation and impairment losses						
As at 1 January	—	184.6	184.6	—	171.4	171.4
Exchange adjustments	—	(3.7)	(3.7)	—	0.3	0.3
Amortisation charge for the year	—	10.0	10.0	—	12.9	12.9
As at 31 December	—	190.9	190.9	—	184.6	184.6
Net book value as at 31 December	620.2	88.3	708.5	637.1	86.9	724.0

* Restated – see Note 17.2 of the Group Financial Statements for an explanation and analysis of the prior year adjustments made in respect of Goodwill as at 31 December 2018.

16.3 Analysis of goodwill by cash-generating unit (CGU)

Goodwill acquired in a business combination is allocated to each of the Group's CGUs expected to benefit from the synergies of the combination. For the purposes of impairment testing, the Directors consider that the Group has four CGUs: Steel Advanced Refractories, Steel Flow Control, Steel Digital Services (Sensors & Probes) and the Foundry Division. These CGUs represent the lowest level within the Group at which goodwill is monitored (note 17.3).

	2019 £m	2018 Restated* £m
Steel Flow Control	277.5	291.1
Steel Advanced Refractories	131.1	125.0
Foundry	211.6	221.0
Total goodwill	620.2	637.1

* Restated – see Note 17.2 of the Group Financial Statements for an explanation and analysis of the prior year adjustments made in respect of Goodwill as at 31 December 2018.

16.4 Analysis of other intangible assets

Other intangible assets are amortised on a straight-line basis over their estimated useful lives. The assets acquired and their remaining useful lives are shown below.

	Remaining useful life years	Net book value as at 31 Dec 2019 £m	Net book value as at 31 Dec 2018 £m
Foseco			
— customer relationships (useful life: 20 years)	8.3	45.2	53.4
— trade name (useful life: 20 years)	8.3	30.0	33.5
CCPI			
— customer relationships (useful life: 20 years)	19.2	13.1	—
Total		88.3	86.9

17. Impairment of Tangible and Intangible Assets**17.1 Accounting policy**

The Directors regularly review the performance of the business and the external business environment to determine whether there is any indication that the Group's tangible and intangible assets have suffered an impairment loss. If such indication exists, the higher of the value in use and the fair value less costs to sell off the asset is estimated and compared with the carrying value in order to determine the extent, if any, of the impairment loss. Where it is not feasible to estimate the recoverable amount of an individual asset, the Directors estimate the recoverable amount of the CGU to which the asset belongs. In addition, goodwill is tested for impairment on an annual basis. Goodwill acquired in a business combination is allocated to each of the Group's CGUs expected to benefit from the synergies of the combination and the Directors carry out annual impairment testing of the carrying value of each CGU, to assess the need for any impairment of the carrying value of the associated goodwill and other intangible and tangible assets. The CCPI business acquired during the year has been integrated into the Steel reportable segment and is not monitored by the chief operating decision maker as a CGU. Its goodwill is tested as part of the Steel Advanced Refractories CGU.

For the purpose of impairment testing, the recoverable amount of an asset or CGU is the higher of (i) its fair value less costs to sell and (ii) its value in use. If the recoverable amount of a CGU is less than its carrying amount, the resulting impairment loss is allocated first to reduce the carrying amount of any goodwill allocated to the CGU and then to the other assets of the CGU pro rata on the basis of the carrying amount of each asset in the CGU. An impairment loss recognised for goodwill is not reversed in a subsequent period. An impairment loss recognised in a prior year for an asset other than goodwill may be reversed where there has been a change in the estimates used to measure the asset's recoverable amount since the impairment loss was recognised.

Notes to the Group Financial Statements continued

17. Impairment of Tangible and Intangible Assets continued

17.2 Prior year restatement

A prior year restatement was recognised relating to the year ended 31 December 2017 following a review of the Group's accounting policy for the impairment of tangible and intangible assets. Further to correspondence with the Financial Reporting Council (FRC), it was identified that, in previous years, the Group's goodwill impairment test had not been performed in accordance with the requirements of IAS 36, Impairment of Assets.

Previously the Group identified two reportable segments: Steel and Foundry, to represent the lowest level at which goodwill was monitored. In contrast, paragraph 80(b) of IAS 36 does not permit goodwill to be tested at a level higher than the level of an operating segment. The Group's operating segments are Steel Advanced Refractories, Steel Flow Control, Steel Digital Services (Sensors & Probes) and the Foundry Division.

To ensure compliance with this aspect of IAS 36, the Group has determined the impact of performing goodwill impairment testing at the appropriate operating segment level on the 2017 and 2018 accounts. This has shown that the carrying value of goodwill and certain tangible assets allocated to the Steel Digital Services (Sensors & Probes) operating segment could not be supported by this segment's recoverable amount as at 31 December 2017 and should, therefore, have been impaired at that date.

Goodwill arising in relation to the acquisitions of ECIL Met Tec in 2014 and the Sidermes Group in 2015 was allocated to the Steel Digital Services (Sensors & Probes) segment. Goodwill of £4.6m and £12.8m respectively was recognised on these acquisitions. The growth of this operating segment has been slower than initially expected due to end market weakness resulting in a recoverable amount of the segment that was £27.6m lower than its carrying value as at 31 December 2017. This difference has been recognised as an impairment loss against goodwill allocated to the segment (£17.4m) and property, plant and equipment (£10.2m).

The overall effect of this impairment is a decrease in net assets of £27.6m as at 31 December 2017, 31 December 2018 and 31 December 2019. There is no material impact on reported profit and cash flow for the years ended 31 December 2018 and 31 December 2019.

17.3 Key assumptions and methodology

The key assumptions in determining value in use are projected cash flows, growth rates and discount rates.

Projected cash flows for the next three years have been based on the latest Board approved budgets and strategic plans. They reflect management's expectations of revenue, EBITDA growth, capital expenditure, working capital and adjusted operating cash flows, based on past experience and future expectations of business performance and take into account the cyclicality of the business in which the CGU operates. Cash flows beyond the period of the strategic plans have been extrapolated using a perpetuity growth rate of 2.5% (2018: 2.5%). The growth rate has been calculated using GDP growth forecasts published by the International Monetary Fund for the Group's end-markets. These GDP growth forecasts have been weighted to reflect the Group's weighted average sales in each end-market during 2019.

The cash flows have been discounted to their current value using pre-tax discount rates, which represent each CGU's weighted average cost of capital (WACC). The assumptions used in the calculation of the WACC for each CGU have been benchmarked to externally available data. These are industry-specific beta coefficients, risk-free rates and equity risk premiums. The pre-tax discount rate used for the Steel Flow Control, Steel Advanced Refractories and Steel Digital Services (Sensors & Probes) CGUs was 13.3% (2018: 13.3%) and for the Foundry CGU was 13.1% (2018: 12.5%). The increase in the Foundry pre-tax discount rate has been driven by an increase in the equity risk premium partially offset by a reduction in risk free rate – these changes are not specific to Vesuvius.

The Group carried out its annual goodwill impairment test as at 31 October 2019 (2018: 31 October 2018). The recoverable amount of each CGU significantly exceeded its carrying value, therefore no impairment charges have been recognised. The recoverable amount of each CGU was also checked against its carrying value as at 31 December 2019 and no impairment triggers were identified.

There is significant headroom in the Steel Flow Control and Steel Advanced Refractories CGUs. No reasonably possible changes in the key assumptions would cause the carrying amount of the CGUs to exceed the recoverable amount. A sensitivity analysis was carried out in which the pre-tax discount rate used for each CGU was increased by 2.0%, the recoverable amount of each CGU still significantly exceeded its carrying value. A further sensitivity analysis was carried out in which the perpetuity growth rate used for each CGU was reduced to 1.0%; the recoverable amount of each CGU still significantly exceeded its carrying value. A significant increase in the pre-tax discount rate and decrease in the perpetuity growth rate beyond the scope considered above would need to occur simultaneously to result in impairment. In conclusion, the probability of future impairment remains low.

18. Trade and Other Receivables

18.1 Accounting policy

Trade and other receivables are initially recognised at fair value and subsequently measured at amortised cost, using the effective interest method, less impairment losses. Details on impairment of financial assets are disclosed in Note 25.

18.2 Analysis of trade and other receivables

	2019				2018			
	Gross £m	Expected Credit Loss Provision £m	Net £m	ECL Provision Coverage (1)	Gross £m	Expected Credit Loss Provision £m	Net £m	ECL Provision Coverage (1)
Trade receivables — current	235.9	(0.6)	235.3	0.3%	275.2	(0.7)	274.5	0.3%
— 1 to 30 days past due	44.5	(0.4)	44.1	0.9%	60.5	(0.7)	59.8	1.2%
— 31 to 60 days past due	17.1	(0.1)	17.0	0.6%	19.4	(0.1)	19.3	0.5%
— 61 to 90 days past due	5.0	(0.7)	4.3	14.0%	8.9	(0.6)	8.3	6.7%
— over 90 days past due	30.8	(24.8)	6.0	79.2%	36.9	(26.1)	10.8	70.6%
Trade receivables	333.3	(26.6)	306.7		400.9	(28.2)	372.7	
Other receivables			55.4				48.1	
Prepayments			17.5				19.6	
Total trade and other receivables			379.6				440.4	

(1) ECL provision coverage is Expected Credit Loss provision divided by gross trade receivables.

Historical experience has shown that the Group's trade receivable provisions are maintained at levels that are sufficient to absorb actual bad debt write-offs, without being excessive. The Group considers the credit quality of financial assets that are neither past due nor impaired as good.

Included within Other receivables are promissory notes of £26.6m (2018: £24.7m). The majority of these notes relate to customers in China and have typical maturities of 6 months from issuing date. The full amount of revenue is recognised from the customer when performance obligations are satisfied in accordance with IFRS 15. Other receivables also include VAT receivables of £14.3m (2018: £10.6m) and insurance reimbursements (see Note 30.2). The Group applies the expected credit loss model under IFRS 9 to these other receivables. The expected credit loss for other receivables are immaterial.

The maximum exposure to credit risk at the end of the reporting period is the net carrying amount of these trade and other receivables.

18.3 Impairment of trade and other receivables

Details relating to the impairment of trade receivables are disclosed in Note 25, 'Financial Risk Management'.

19. Inventories

19.1 Accounting policy

Inventories are stated at the lower of cost (using the first in, first out method) and net realisable value. Cost comprises expenditure incurred in purchasing or manufacturing inventories together with all other costs directly incurred in bringing the inventory to its present location and condition and, where appropriate, attributable production overheads based on normal activity levels. Net realisable value represents the estimated selling price less all estimated costs of completion and costs to be incurred in marketing, selling and distribution. The amount of any write-down of inventories to net realisable value is recognised as an expense in the year in which the write-down occurs.

19.2 Analysis of inventories

	2019 £m	2018 £m
Raw materials	67.3	84.2
Work-in-progress	18.5	19.8
Finished goods	127.1	140.3
Total inventories	212.9	244.3

The cost of inventories recognised as an expense and included in manufacturing costs of continuing operations in the Group Income Statement during the year was £642.6m (2018: £677.4m).

The net inventories of £212.9m include a provision for obsolete stock of £11.9m (2018: £14.2m). There were reversals of inventory write-downs of £0.3m (2018: write downs of £2.6m).

Notes to the Group Financial Statements continued

20 Acquisitions and Divestments

20.1 CCPI

On 1 March 2019, Vesuvius plc acquired 100% of the share capital of CCPI Inc (CCPI), a specialty refractory producer focused on tundish (steel continuous casting) applications (65% of sales) and aluminium (35% of sales). CCPI is based in Ohio, USA, and has become part of the Group's Steel Advanced Refractories business unit. The transaction valued CCPI at US\$43.4 million (£33.3 million) on a cash and debt free basis and was funded from Vesuvius' internal resources. The acquisition increased Vesuvius' share of the tundish market and gives the Group an entry to the aluminium market.

Final valuations have been completed and the fair values of the assets and liabilities recognised as a result of the acquisition are as follows:

	£m
Cash and cash equivalents	0.9
Property, plant and equipment	5.2
Intangible asset (customer relationships)	13.8
Inventories	4.2
Receivables	5.1
Payables	(3.1)
Lease liabilities	(1.5)
Deferred tax	(2.8)
Net identifiable assets acquired	21.8
Goodwill	11.5
Consideration	33.3

The goodwill is attributable to CCPI's competitive reputation in the marketplace and the synergies that Vesuvius expects to gain from the integration of its tundish business into the Steel Advanced Refractories business unit and is expected to be tax deductible.

Included within the property, plant and equipment acquired were right of use leased assets of £1.5m.

The decision to acquire CCPI was driven by its long-standing customer relationships and these are the identifiable intangible assets acquired, they have a useful economic life of 20 years. A deferred tax liability of £3.4m has been provided in relation to these fair value adjustments.

In the period since acquisition, CCPI has contributed £23.8m to revenue, £2.5m to trading profit and £1.8m to operating profit. If the acquisition had occurred on the first day of the financial year, it is estimated that the revenue, trading profit and operating profit from the acquisition would have been £28.9m, £3.0m and £2.3m respectively. On acquisition, CCPI was subsumed into Steel Advanced Refractories activities and goodwill is monitored at the level of the Steel Advanced Refractories operating segment.

The net cash outflow on acquisition was £32.4m, being cash consideration of £33.3m less cash and cash equivalents acquired of £0.9m. Acquisition-related costs of £0.7m are included in administrative expenses in the income statement.

The Group did not acquire any material interests in any companies other than CCPI during the year ended 31 December 2019, however contingent consideration of £0.3m was paid during the year (2018: £1.1m) in respect of the previous acquisition of Process Metrix.

20.2 Joint venture disposal

In June 2019 Vesuvius completed the sale of its 50% interest in Angang Vesuvius Refractory Company, Ltd. The carrying value of the investment was £6.9m at the date of divestment. The consideration received (in early July 2019) was cash of £6.8m resulting in a profit after foreign currency adjustments of £1.1m.

21. Issued Share Capital

21.1 Accounting policy

Equity instruments issued by the Company are recorded as the proceeds received, net of direct issue costs.

21.2 Analysis of issued share capital

The issued and fully paid ordinary share capital of the Company as at 31 December 2019 was 278,485,071 shares of 10 pence each (2018: 278,485,071 shares of 10 pence each). Further information relating to the Company's share capital is given in Note 9 to the Company's Financial Statements.

22. Retained Earnings

	Reserve for own shares £m	Share option reserve £m	Other retained earnings £m	Total retained earnings £m
As at 1 January 2018	(34.2)	4.6	2,399.9	2,370.3
Profit for the year	—	—	138.3	138.3
Remeasurement of defined benefit liabilities/assets	—	—	5.1	5.1
Recognition of share-based payments	—	3.7	—	3.7
Release of share option reserve on exercised and lapsed options	1.5	(1.5)	—	—
Purchase of ESOP shares	(13.4)	—	—	(13.4)
Income tax on items recognised in other comprehensive income	—	—	6.0	6.0
Dividends paid (Note 24)	—	—	(50.0)	(50.0)
As at 1 January 2019 – as reported	(46.1)	6.8	2,499.3	2,460.0
Restatement upon adoption of IFRIC 23 (Note 2.6)	—	—	1.5	1.5
As at 1 January 2019	(46.1)	6.8	2,500.8	2,461.5
Profit for the year	—	—	80.3	80.3
Remeasurement of defined benefit liabilities/assets	—	—	(3.6)	(3.6)
Recognition of share-based payments	—	4.5	—	4.5
Release of share option reserve on exercised and lapsed options	6.8	(6.8)	—	—
Income tax on items recognised in other comprehensive income	—	—	1.9	1.9
Dividends paid (Note 24)	—	—	(53.9)	(53.9)
As at 31 December 2019	(39.3)	4.5	2,525.5	2,490.7

During the prior year, Cookson Investments (Jersey) Limited as Trustee of the Vesuvius Group Employee Share Ownership Plan ('ESOP'), instructed the purchase of 2,385,000 Vesuvius plc ordinary shares for the ESOP for a total consideration of £13.4m.

23. Other Reserves

	Other reserves £m	Translation reserve £m	Total other reserves £m
As at 1 January 2018	(1,499.3)	129.9	(1,369.4)
Exchange differences on translation of the net assets of foreign operations	—	11.4	11.4
Exchange translation differences arising on net investment hedges	—	(11.5)	(11.5)
As at 1 January 2019	(1,499.3)	129.8	(1,369.5)
Exchange differences on translation of the net assets of foreign operations	—	(71.0)	(71.0)
Reclassification of foreign currency translation reserve on disposal of share in joint venture	—	(1.1)	(1.1)
Exchange translation differences arising on net investment hedges	—	14.1	14.1
As at 31 December 2019	(1,499.3)	71.8	(1,427.5)

Within other reserves as at 31 December 2019 is £1,499.0m (2018: £1,499.0m) arising from the demerger of Cookson Group plc, being the excess of the Vesuvius plc share capital of £1,777.9m over the total share capital and share premium of Cookson Group plc as at 14 December 2012 of £278.9m.

The translation reserve in the table above comprises all foreign exchange differences attributable to the owners of the parent. These exchange differences arise from the translation of the financial statements of foreign operations and from the translation of financial instruments that hedge the Group's net investment in foreign operations. In addition to foreign exchange differences attributable to the owners of the parent, the Group Statement of Comprehensive Income includes foreign exchange differences attributable to non-controlling interests.

24. Dividends

A final dividend for the year ended 31 December 2018 of £37.2m (2017: £33.8m), equivalent to 13.8 pence (2017: 12.5 pence) per ordinary share, was paid in May 2019 (May 2018) and an interim dividend for the year ended 31 December 2019 of £16.7m (2018: £16.2m), equivalent to 6.2 pence (2018: 6.0 pence) per ordinary share, was paid in September 2019 (September 2018).

A proposed final dividend for the year ended 31 December 2019 of £38.6m, equivalent to 14.3 pence per ordinary share, is subject to approval by shareholders at the Company's Annual General Meeting and has not been included as a liability in these financial statements. If approved by shareholders, the dividend will be paid on 22 May 2020 to ordinary shareholders on the register at 17 April 2020.

Notes to the Group Financial Statements continued

25. Financial Risk Management

25.1 Accounting policy

(a) Valuation of financial assets and liabilities

The Group's financial assets are measured at amortised cost with the exception of certain investments in debt and equity, which are measured at fair value through other comprehensive income. Financial liabilities are measured at amortised cost with the exception of certain derivative instruments, which are measured at fair value through profit and loss.

IFRS 13 Fair Value Measurement requires classification of financial instruments within a hierarchy that prioritises the inputs to fair value measurement. The three levels of the fair value hierarchy are:

Level 1 – Unadjusted quoted prices in active markets for identical assets or liabilities;

Level 2 – Inputs other than quoted prices that are observable for the asset or liability, either directly or indirectly;

Level 3 – Inputs that are not based on observable market data.

Loans and borrowings are initially recognised at fair value net of directly attributable transaction costs. After initial recognition they are measured at amortised cost, using the effective interest method.

(b) Foreign currencies

The individual financial statements of each Group entity are prepared in their functional currency, which is the currency of the primary economic environment in which that entity operates. For the purpose of the Group Financial Statements, the results and financial position of each entity are translated into pound sterling, which is the presentational currency of the Group.

Reporting foreign currency transactions in functional currency

Transactions in currencies other than the entity's functional currency (foreign currencies) are initially recorded at the rates of exchange prevailing on the dates of the transactions or at an average rate which is a reasonable approximation of actual. At each subsequent balance sheet date:

- (i) Foreign currency monetary items are retranslated at the rates prevailing at the balance sheet date. Exchange differences arising on the settlement or retranslation of monetary items are recognised in the Group Income Statement
- (ii) Non-monetary items measured at historical cost in a foreign currency are not retranslated

Translation from functional currency to presentational currency

When the functional currency of a Group entity is different from the Group's presentational currency (pound sterling), its results and financial position are translated into the presentational currency as follows:

- (i) Assets and liabilities are translated using exchange rates prevailing at the balance sheet date
- (ii) Income and expense items are translated at average exchange rates for the year, except where the use of such average rates does not approximate the exchange rate at the date of a specific transaction, in which case the transaction rate is used
- (iii) All resulting exchange differences are recognised in other comprehensive income and presented in the translation reserve in equity and are reclassified to profit or loss in the period in which the foreign operation is disposed of

Net investment in foreign operations

Exchange differences arising on a monetary item that forms part of a reporting entity's net investment in a foreign operation are initially recognised in other comprehensive income and presented in the translation reserve in equity and reclassified to profit or loss on disposal of the net investment.

Financial reporting in hyperinflationary economies

Entities with a functional currency of the Argentine peso are required to apply IAS 29 'Financial reporting in hyper-inflationary economies' in accounting periods ending on or after 1 July 2018.

The results for the year ended 31 December 2019 from Group subsidiaries with a functional currency of the Argentine peso have therefore been restated to current cost using indices prescribed by the Government Board of the Argentine Federation of Professional Councils of Economic Sciences (FACPCE). Comparative figures have not been restated.

Transactions in Argentine pesos have been translated using exchange rates prevailing at the balance sheet date.

(c) Derivative financial instruments

Derivatives are measured at fair value. The fair value of forward foreign currency contracts is calculated using market prices at the balance sheet date.

25.2 Financial risk factors

The Group's Treasury department, acting in accordance with policies approved by the Board, is principally responsible for managing the financial risks faced by the Group. The Group's activities expose it to a variety of financial risks, the most significant of which are market risk and liquidity risk.

Analysis of financial instruments

The following table summarises Vesuvius' financial instruments measured at fair value and shows the level within the fair value hierarchy in which the financial instruments have been classified.

	2019		2018	
	Assets £m	Liabilities £m	Assets £m	Liabilities £m
Investments (Level 2)	0.8	—	1.0	—
Derivatives not designated for hedge accounting purposes (Level 2)	0.6	(0.7)	0.8	(0.6)

(a) Derivative financial instruments

The Group uses derivative financial instruments ('derivatives'), in the form of forward foreign currency contracts to manage the effects of its exposure to foreign exchange risk. Derivatives are only used for economic hedging purposes and not as speculative investments. However, where derivatives do not meet the hedge accounting criteria, they are classified as 'held for trading' for accounting purposes and are accounted for at fair value through profit or loss. They are presented as current assets or liabilities to the extent they are expected to be settled within 12 months after the end of the reporting period.

The fair value of Derivatives outstanding at the year-end has been booked through the Income Statement in 2019. All of the fair values shown in the table above are classified under IFRS 13 as Level 2 measurements which have been calculated using quoted prices from active markets, where similar contracts are traded and the quotes reflect actual transactions in similar instruments. All of the derivative assets and liabilities reported in the table above will mature within a year of the balance sheet date.

(b) Market risk

Market risk is the risk that either the fair values or the cash flows of the Group's financial instruments may fluctuate because of changes in market prices. The Group is principally exposed to market risk through fluctuations in exchange rates and interest rates.

Currency risk

The Group Income Statement is exposed to currency risk on monetary items that are denominated in currencies other than the functional currency of the companies in which they are held. The currency profile of borrowings and financial assets is shown in the table below.

	2019					2018				
	Sterling £m	Euro £m	Chinese Renminbi £m	US Dollar £m	Other £m	Sterling £m	Euro £m	Chinese Renminbi £m	US Dollar £m	Other £m
Trade receivables	2.8	29.2	—	35.0	16.8	(8.4)	95.1	67.2	37.2	32.0
Cash at bank	0.1	5.2	—	9.1	12.5	1.2	33.4	25.7	24.2	14.2
Trade payables	(3.1)	(15.3)	(0.1)	(23.2)	(15.3)	(5.9)	(37.0)	(31.1)	(14.7)	(27.8)
Private Placement Notes	—	(109.7)	—	(150.8)	—	—	(116.9)	—	(156.8)	—
Bank loans & overdrafts	—	(113.5)	—	(0.6)	(0.4)	—	(122.6)	—	(6.6)	(0.1)
Finance leases	(0.1)	(0.8)	—	—	(0.6)	—	—	—	—	—
Foreign currency forward contracts										
— Buy foreign currency (Private Placement)	—	84.5	—	—	—	—	89.9	—	—	—
— Buy foreign currency (Other)	—	1.0	—	1.5	1.2	—	—	—	3.1	—
— Sell foreign currency	—	(18.0)	—	(15.9)	—	—	(8.3)	—	(4.3)	—
	(0.3)	(137.4)	(0.1)	(144.9)	14.2	(13.1)	(66.4)	61.8	(117.9)	18.3

The Group arranges a rolling short dated Euro/Sterling foreign exchange swap in respect of €100m of its Private Placement fixed rate financial liabilities (2018: €100m). This has the effect of reducing the currency exposure of the Group's Net Debt by €100m.

The Group has £(1.4)m (2018: £(0.8)m) of exchange differences recognised in the income statement.

Notes to the Group Financial Statements continued

25. Financial Risk Management continued

(b) Market risk continued

The tables below show the net unhedged monetary assets and liabilities of Group companies that are not denominated in their functional currency and which could give rise to exchange gains and losses in the Group Income Statement.

	Net unhedged monetary assets/(liabilities)					Total £m
	Sterling £m	Euro £m	Chinese Renminbi £m	US Dollar £m	Other £m	
Functional currency						
Sterling	—	(139.7)	—	(150.6)	0.8	(289.5)
US dollar	—	0.7	—	—	1.4	2.1
Euro	0.5	—	—	1.6	0.1	2.2
Chinese Renminbi	(0.4)	(1.1)	—	(3.9)	(0.1)	(5.5)
Other	(0.4)	2.7	(0.1)	8.0	12.0	22.2
As at 31 December 2019	(0.3)	(137.4)	(0.1)	(144.9)	14.2	(268.5)

	Net unhedged monetary assets/(liabilities)					Total £m
	Sterling £m	US dollar £m	Euro £m	Chinese Renminbi £m	Other £m	
Functional currency						
Sterling	—	0.6	0.5	—	3.6	4.7
US dollar	—	—	2.6	—	(3.5)	(0.9)
Euro	(0.5)	4.2	—	—	—	3.7
Chinese Renminbi	(1.5)	3.4	0.1	—	(0.1)	1.9
Other	(0.1)	14.3	3.3	(0.4)	19.0	36.1
As at 31 December 2018	(2.1)	22.5	6.5	(0.4)	19.0	45.5

The Group finances its operations partly by obtaining funding through external borrowings. Where these borrowings are not in sterling they may be designated as net investment hedges. This enables gains and losses arising on retranslation to be charged to other comprehensive income, providing a partial offset in equity against the gains and losses arising on translation of overseas net assets.

During 2019 €161m and \$200m of borrowings were designated as hedges of net investments in €161m and \$200m worth of overseas foreign operations.

As the value of the borrowings exactly matches the designated hedged portion of the net investments the relevant Hedge Ratio is 1:1. The net investment hedges are therefore 100% effective with no ineffectiveness.

The total retranslation impact of borrowings designated as net investment hedges was £14.1m (2018: £11.5m).

Interest rate risk

The Group's interest rate risk principally arises in relation to its borrowings. Where borrowings are held at floating rates of interest, fluctuations in interest rates expose the Group to variability in the cash flows associated with its interest payments, and where borrowings are held at fixed rates of interest, fluctuations in interest rates expose the Group to changes in the fair value of its borrowings. The Group's policy is to maintain a mix of fixed and floating rate borrowings, within certain parameters agreed from time to time by the Board, in order to optimise interest cost and reduce volatility in reported earnings.

As at 31 December 2019, the Group had \$200m and €130m (£260.7m in total) of US Private Placement Loan Notes (USPP) outstanding, which carry a fixed rate of interest, representing 59% of the Group's total borrowings outstanding at that date. The interest rate profile of the Group's borrowings is detailed in the tables below.

	Financial liabilities (gross borrowings)		
	Fixed rate £m	Floating rate £m	Total £m
Sterling	—	66.2	66.2
US dollar	150.8	0.9	151.7
Euro	109.9	113.4	223.3
Other	—	1.5	1.5
Capitalised arrangement fees	(1.2)	—	(1.2)
As at 31 December 2019	259.5	182.0	441.5

	Financial liabilities (gross borrowings)		
	Fixed rate £m	Floating rate £m	Total £m
Sterling	—	73.0	73.0
US dollar	156.8	10.4	167.2
Euro	116.9	121.2	238.1
Other	—	8.4	8.4
Capitalised arrangement fees	(1.8)	—	(1.8)
As at 31 December 2018	271.9	213.0	484.9

Information in respect of the currency risk management of £100m of Euro denominated fixed rate financial liabilities is provided in Note 25 (b).

The floating rate financial liabilities shown in the tables above typically bear interest at the inter-bank offered rate of the appropriate currency, plus a margin. The fixed rate financial liabilities of £260.7m (2018: £273.7m) have a weighted average interest rate of 3.9% (2018: 3.8%) and a weighted average period for which the rate is fixed of 4.8 years (2018: 5.8 years).

The financial assets attract floating rate interest.

Based upon the interest rate profile of the Group's financial liabilities shown in the tables above, a 1% increase in market interest rates would increase both the finance costs charged in the Group Income Statement and the interest paid in the Group Statement of Cash Flows by £1.8m (2018: £2.1m), and a 1% reduction in market interest rates would decrease both the finance costs charged in the Group Income Statement and the interest paid in the Group Statement of Cash Flows by £1.8m (2018: £2.1m).

(c) Credit risk

Credit risk arises from cash and cash equivalents, derivative financial assets and deposits with banks and financial institutions, as well as credit exposures to customers, including outstanding receivables.

(i) Risk management

For banks and financial institutions, Group policy is that only independently rated entities with a minimum rating of 'A-' are accepted as counterparties. In addition, the Group's operating companies have policies and procedures in place to assess the creditworthiness of the customers with whom they do business.

(ii) Impairment of financial assets

The Group subjects trade receivables for sales of inventory and from the provision of services to the expected credit loss model. While cash and cash equivalents are also subject to the impairment requirements of IFRS 9, the identified impairment loss was immaterial.

The Group applies the IFRS 9 simplified approach to measuring expected credit losses which uses a lifetime expected loss allowance for all trade receivables and contract assets. The expected loss rates are based on the payment profiles of sales over a period of 60 months before 31 December 2019 and the corresponding historical credit losses experienced within this period. The historical loss rates are adjusted to reflect current and forward-looking information on macroeconomic factors affecting the ability of the customers to settle the receivables. The Group has identified the current state of the economy (such as market interest rates or growth rates) and particular industry issues in the countries in which it sells its goods and services to be the most relevant factors, and accordingly adjusts the historical loss rates based on expected changes in these factors.

Regardless of the analysis above, a significant increase in credit risk is presumed if a debtor is more than 30 days past due in making a contractual payment. Where objective evidence exists that a trade receivable balance may be impaired, provision is made for the difference between its carrying amount and the present value of the estimated cash that will be recovered. Evidence of impairment may include such factors as a change in credit risk profile of the customer, the customer being in default on a contract, or the customer entering bankruptcy or financial reorganisation proceedings. All significant balances are reviewed individually for evidence of impairment.

Trade receivables and contract assets are written off when there is no reasonable expectation of recovery. Indicators that there is no reasonable expectation of recovery include, amongst others, the failure of a debtor to engage in a repayment plan with the Group, and a failure to make contractual payments for a period of greater than 120 days past due. Where loans or receivables have been written off, the company continues to engage in enforcement activity to attempt to recover the receivable due. Where recoveries are made, these are recognised within the Income Statement.

Notes to the Group Financial Statements continued

25. Financial Risk Management continued

(c) Credit risk continued

The closing expected credit loss allowance for trade receivables as at 31 December 2019 reconciles to the opening loss allowances as follows:

	2019 £m	2018 £m
As at 1 January	28.2	31.7
(Decrease)/increase in expected credit loss allowance recognised in profit or loss during the year	2.3	(1.1)
Receivables written off during the year as uncollectable	(3.0)	(2.1)
Exchange adjustments	(0.9)	(0.3)
As at 31 December	26.6	28.2

The charge for the year shown in the table above is recorded within administration, selling and distribution costs in the Group Income Statement.

Historical experience has shown that the Group's trade receivable provisions are maintained at levels that are sufficient to absorb actual bad debt write-offs, without being excessive. The Group considers the credit quality of financial assets that are neither past due nor impaired as good.

The Group also applies the expected credit loss model under IFRS 9 to other receivables. If, at the reporting date, the credit risk of the receivables has not increased significantly since initial recognition, the Group measures the loss allowance at an amount equal to 12 month expected credit losses. If the credit risk on that receivable has increased significantly since initial recognition, the Group measures the loss allowance at an amount equal to the lifetime expected credit losses. The expected credit loss on other receivables are not material.

(d) Liquidity risk

Liquidity risk is the risk that the Group might have difficulties in meeting its financial obligations. The Group manages this risk by ensuring that it maintains sufficient levels of committed borrowing facilities and cash and cash equivalents to ensure that it can meet its operational cash flow requirements and any maturing financial liabilities, whilst at all times operating within its financial covenants. The level of operational headroom provided by the Group's committed borrowing facilities is reviewed at least annually as part of the Group's three-year planning process. Where this process indicates a need for additional finance, this is addressed on a timely basis by means of either additional committed bank facilities or raising finance in the capital markets.

As at 31 December 2019, the Group had committed borrowing facilities of £609.7m (2018: £573.7m), of which £174.2m (2018: £119.2m) were undrawn. These undrawn facilities are due to expire in June 2022. The Group's borrowing requirements are met by USPP, a multi-currency committed syndicated bank facility of £300.0m (2018: £300.0m) and a bilateral bank facility of £49.0m (2018: Nil) which is fully collateralised against £54.0m of the Group's cash balance in China. The USPP facility was fully drawn as at 31 December 2019 and amounted to £260.7m (\$200.0m and €130.0m), of which \$140.0m is repayable in December 2020, €15.0m in 2021, \$30.0m in 2023, €15.0m in 2025, €50.0m in 2027, \$30.0m in 2028 and €50.0m in 2029. The £49.0m collateralised bank facility matures in May 2020 but at the date of this report there is an intention to extend the facility for a further 12 months either in full or in part. The maturity analysis of the Group's gross borrowings (including interest) is shown in the tables below.

	Within one year £m	Between 1 and 2 years £m	Between 2 and 5 years £m	Over 5 years £m	Total contractual cash flows £m	Carrying amount £m
As at 31 December 2019						
Trade payables	173.8	—	—	—	173.8	173.8
Loans and overdrafts	171.8	17.4	157.0	134.9	481.1	442.8
Lease liabilities	12.0	9.9	9.2	9.3	40.4	33.3
Capitalised arrangement fees	—	—	—	—	—	(1.2)
Total interest-bearing borrowings	183.8	27.3	166.2	144.2	521.5	474.9
Total non-derivative financial liabilities	357.6	27.3	166.2	144.2	695.3	648.7

As at 31 December 2018	Within one year £m	Between 1 and 2 years £m	Between 2 and 5 years £m	Over 5 years £m	Total contractual cash flows £m	Carrying amount £m
Trade payables	197.3	—	—	—	197.3	197.3
Loans and overdrafts	28.2	109.7	217.9	127.0	482.8	482.8
Finance lease liabilities	1.7	1.2	1.0	—	3.9	3.9
Capitalised arrangement fees	—	—	—	—	—	(1.8)
Total interest-bearing borrowings	29.9	110.9	218.9	127.0	486.7	484.9
Total non-derivative financial liabilities	227.2	110.9	218.9	127.0	684.0	682.2

Capitalised arrangement fees shown in the tables above, which have been recognised as a reduction in borrowings in the financial statements, amounted to £1.2m as at 31 December 2019 (31 December 2018: £1.8m), of which £0.8m (2018: £1.0m) related to the USPP and £0.4m (2018: £0.8m) related to the syndicated bank facility.

25.3 Capital management

The Company considers its capital to be equal to the sum of its total equity, disclosed on the Group Balance Sheet, and net debt (Note 14). It monitors its capital using a number of KPIs, including free cash flow, average working capital to sales ratios, net debt to EBITDA ratios and RONA (Note 4). The Group's objectives when managing its capital are:

- > To ensure that the Group and all of its businesses are able to operate as going concerns and ensure that the Group operates within the financial covenants contained within its debt facilities
- > To have available the necessary financial resources to allow the Group to invest in areas that may deliver acceptable future returns to investors
- > To maintain sufficient financial resources to mitigate against risks and unforeseen events
- > To maximise shareholder value through maintaining an appropriate balance between the Group's equity and net debt

The Group operated within the requirements of its debt covenants throughout the year and has sufficient liquidity headroom within its committed debt facilities. Details of the Group's covenant compliance and committed debt facilities can be found in the Strategic Report on page 40.

25.4 Cash pooling arrangements

The Group enters into zero balancing and notional cash pooling arrangements as part of its ongoing Treasury management activities. Certain notional cash pooling arrangements meet the criteria for offsetting as clarified in amendments to IAS 32 Financial Instruments, about a legally enforceable right of set-off both in the ordinary course of business and in the event of default. The following tables set out the amounts of recognised financial assets and liabilities shown as cash and cash borrowings and those amounts which are subject to these agreements.

	Gross amounts of recognised financial assets/ liabilities £m	Gross amounts of recognised financial assets/ liabilities offset in the statement of financial position £m	Net amounts of financial assets/liabilities presented in the statement of financial position £m
Financial assets/liabilities			
Cash deposits	229.7	(0.5)	229.2
Cash borrowings	(7.6)	0.5	(7.1)
As at 31 December 2019	222.1	—	222.1
Financial assets/liabilities			
Cash deposits	237.7	(0.8)	236.9
Cash borrowings	(24.3)	0.8	(23.5)
As at 31 December 2018	213.4	—	213.4

Notes to the Group Financial Statements continued

26. Employee Benefits

26.1 Accounting policy

The net surplus or net liability recognised in the Group Balance Sheet for the Group's defined benefit plans is the present value of the defined benefit obligation at the balance sheet date, less the fair value of the plan assets. The defined benefit obligation is calculated by independent actuaries using the projected unit credit method and by discounting the estimated future cash flows using interest rates on high-quality corporate bonds that have durations approximating the terms of the related pension liability. Any asset recognised in respect of a surplus arising from this calculation is limited to the asset ceiling, where this is the present value of any economic benefits available in the form of refunds or reductions in future contributions in respect of the plans.

The expense for the Group's defined benefit plans is recognised in the Group Income Statement as shown in Note 26.8. Actuarial gains and losses arising on the assets and liabilities of the plans are reported within the Group Statement of Comprehensive Income; and gains and losses arising on settlements and curtailments are recognised in the Group Income Statement in the same line as the item that gave rise to the settlement or curtailment or, if material, separately reported as a component of operating profit.

26.2 Group post-retirement plans

The Group operates a number of pension plans around the world, both defined benefit and defined contribution, and accounts for them in accordance with IAS 19.

The Group's principal defined benefit pension plans are in the UK and the US, the benefits of which are based upon the final pensionable salaries of plan members. The assets of these plans are held separately from the Group in trustee-administered funds. The trustees are required to act in the best interests of the plans' beneficiaries. The Group also has defined benefit pension plans in other territories but, except for those in Germany, these are not individually material in relation to the Group.

(a) Defined benefit pension plans – UK

The Group's main defined benefit pension plan in the UK ('the UK Plan') is closed to new members and to future benefit accrual. The existing plan was established under a trust deed and is subject to the Pensions Act 2004 and guidance issued by the UK Pensions Regulator.

A full actuarial valuation of the UK Plan is carried out every three years by an independent actuary for the UK Plan Trustee in line with the requirements of the Pensions Act 2004, and the last full valuation was carried out as at 31 December 2018. At that date, the market value of plan assets was £605.1m and this represented a funding level of 110% of the accrued plan benefits at the time of £552.0m. Calculated on a 'buy-out' basis (using an estimation of the cost of buying out the UK Plan benefits with an insurance company), the liabilities at that date were £626.7m, representing a funding level of 95%.

There is a 'long-term scheme-specific funding standard' in Part 3 of the Pensions Act 2004. In terms of Part 3, the UK plan is subject to a requirement ('the statutory funding objective') that it must have sufficient and appropriate assets to cover its technical provisions. Such technical provisions are determined as part of the triennial valuation. Under the rules of the UK Plan, the Trustee, after consultation with the Company, has the power to set the funding contributions taking into account the results of the triennial valuation, and the Pension Act 2004 legislation.

(b) Defined benefit pension plans – US

The Group has several defined benefit pension plans in the US, providing retirement benefits based on final salary or a fixed benefit. The Group's principal US defined benefit pension plans are closed to new members and to future benefit accrual for existing members. Actuarial valuations of the US defined benefit pension plans are carried out every year and the last full valuation was carried out as at 31 December 2019. At that date the market value of the plan assets was \$66.6m, representing a funding level of 74.3% of funded accrued plan benefits at that date (using the projected unit method of valuation) of \$89.6m. Funding levels for the Group's US defined benefit pension plans are based upon annual valuations carried out by independent qualified actuaries and are governed by US Government regulations.

The Group's US defined benefit pension plans are subject to the minimum contribution requirements of the Internal Revenue Code Sections 412 and 430. Contributions are determined by trustees, in consultation with the Company, based on the annual valuations which are submitted to the Internal Revenue Service. During the fiscal year beginning 1 January 2019, total minimum required contributions were approximately \$2.6m. Under these funding laws and based on the plan deficit, minimum annual contributions in the period 2020-2022 are likely to be required and are expected to be in the \$3m to \$5m range. Contributions of \$2.6m were made during 2019.

There is a \$1.8m settlement gain reported in the main US defined benefit pension plan in 2019 which relates to lump sum payments of \$4.7m being made in mid-December 2019 to employees who have accepted the offer to receive a lump sum in full settlement of their pension (the defined benefit obligation settled was \$6.5m).

(c) Defined benefit pension plans – Germany

The Group has several defined benefit pension arrangements in Germany which are unfunded, as is common practice in that country. The main plan was closed to new entrants on 31 December 2016 and replaced by a defined contribution plan for new joiners.

(d) Defined benefit pension plans – ROW and other post-retirement benefits

The Group has several defined benefit pension arrangements across the rest of the world, the largest of which are in Belgium. The net liability of the ROW plans at 31 December 2019 was £18.0m (2018: £15.6m). The Group also has liabilities relating to medical insurance arrangements and termination plans which provide for benefit to be paid to employees on retirement. The net liability of these other post-retirement benefits at 31 December 2019 was £6.9m (2018: £7.3m).

(e) Defined contribution pension plans

The total expense for the Group's defined contribution plans in the Group Income Statement amounted to £11.3m (2018: £11.4m continuing operations) and represents the contributions payable for the year by the Group to the plans.

(f) Multi-employer plans

Due to collective agreements, Vesuvius in the US participates, together with other enterprises, in union run multi-employer pension plans for temporary workers hired on sites. These are accounted for as defined contribution plans. The bulk of the multi-employer pension plans related to BMI, which was disposed in 2018. The BMI sale transaction was structured to ensure as best as possible that any pension liability would go to the acquiring company. There is a 5-year window where Vesuvius US could still have some liability for any shortfall in the BMI Plans should the buyer cease to exist.

26.3 Post-retirement liability valuation

The main assumptions used in calculating the costs and obligations of the Group's defined benefit pension plans, as detailed below, are set by the Directors after consultation with independent professionally qualified actuaries and include those used to determine regular service costs and the financing elements related to the plans' assets and liabilities. It is the Directors' responsibility to set the assumptions used in determining the key elements of the costs of meeting such future obligations. Whilst the Directors believe that the assumptions used are appropriate, a change in the assumptions used could affect the Group's profit and financial position.

(a) Mortality assumptions

The mortality assumptions used in the actuarial valuations of the Group's UK, US and German defined benefit pension liabilities are summarised in the table below and have been selected to reflect the characteristics and experience of the membership of those plans.

For the UK Plan, the assumptions used have been derived from the Self-Administered Pension Schemes ('SAPS') All table, with future longevity improvements in line with the 'core' mortality improvement tables published in 2018 by the Continuous Mortality Investigation ('CMI'), with a long-term rate of improvement of 1.25% p. a. For the Group's US plans, the assumptions used have been based on the Pri-2012 mortality tables and MP-2019 projection scale. The Group's major plans in Germany have been valued using the modified Heubeck Richttafel 2018G mortality tables. In respect of the life expectancy tables below, current pensioners are assumed to be 65 years old, while future pensioners are assumed to be 45 years old.

Life expectancy of pension plan members	2019			2018		
	UK years	US years	Germany years	UK years	US years	Germany years
Age to which current pensioners are expected to live — Men	87.0	85.6	85.2	86.2	85.6	85.0
— Women	89.2	87.6	88.7	88.8	87.6	88.6
Age to which future pensioners are expected to live — Men	87.3	87.2	88.0	87.6	87.3	87.8
— Women	90.1	89.1	90.9	90.4	89.2	90.8

(b) Other main actuarial valuation assumptions

	2019			2018		
	UK % p.a.	US % p.a.	Germany % p.a.	UK % p.a.	US % p.a.	Germany % p.a.
Discount rate	1.95	2.85	1.00	2.85	4.00	2.00
Price inflation — using RPI for UK	3.00	2.25	1.50	3.25	2.25	1.70
— using CPI for UK	1.90	n/a	n/a	2.15	n/a	n/a
Rate of increase in pensionable salaries	n/a	n/a	2.25	n/a	n/a	2.45
Rate of increase to pensions in payment	2.90	n/a	1.50	3.15	n/a	1.55

The discount rate used to determine the liabilities of the UK Plan for IAS 19 accounting purposes is required to be determined by reference to market yields on high-quality corporate bonds. The UK discount rate in the above table is based on analysis using the expected future cashflows of the Vesuvius Pension Plan and the AON Hewitt AA yield curve; the US discount rate is based on the Citigroup pension discount curve; and the Germany discount rate is based on AA corporate bond yields included in the iBoxx Euro AA corporate bond indices.

The assumptions for UK price inflation are set by reference to the difference between yields on longer-term conventional government bonds and index-linked bonds, except for CPI, for which no appropriate bonds exist, which is assumed to be 1.1 points lower (2018: 1.1 points lower) than RPI-based inflation.

Notes to the Group Financial Statements continued

26. Employee Benefits continued

26.3 Post-retirement liability valuation continued

(c) Sensitivity analysis of the impact of changes in significant IAS 19 actuarial assumptions

The UK Plan Trustee has entered into a pension insurance buy-in agreement with the Pension Insurance Corporation ('PIC'). The US pensions are not inflation linked. The rate of increase in pensionable salaries and of pensions in payment is therefore not significant to the valuation of the Group's overall pension liabilities.

The sensitivity of the defined benefit obligation to changes in the weighted principal assumptions is:

Assumption	Change in assumption	UK	US	Germany
Discount rate	Increase/decrease by 0.1%			
	— impact on plan liabilities	Decrease/increase by £7.8m	Decrease/increase by £0.9m	Decrease/increase by £1.0m
	— impact on plan assets	Decrease/increase by £3.4m	n/a	n/a
Price inflation	Increase/decrease by 0.1%			
	— impact on plan liabilities	Increase/decrease by £5.8m	n/a	Increase/decrease by £0.3m
	— impact on plan assets	Increase/decrease by £2.6m	n/a	n/a
Mortality	Increase by one year			
	— impact on plan liabilities	Increase by £24.5m	Increase by £3.1m	Increase by £2.0m
	— impact on plan assets	Increase by £17.7m	n/a	n/a

26.4 Defined benefit obligation

The average duration of the obligations to which the liabilities of the Group's principal pension plans relate is 17 years for the UK, 18 years for Germany and 10 years for the US.

	Defined benefit pension plans					Other post-retirement benefit plans	Total
	UK £m	US £m	Germany £m	ROW £m	Total £m	£m	£m
Present value as at 1 January 2019	455.9	79.5	47.8	44.6	627.8	7.3	635.1
Exchange differences	—	(3.2)	(3.1)	(2.7)	(9.0)	(0.2)	(9.2)
Current service cost	—	0.1	1.2	2.8	4.1	0.4	4.5
Past service cost	—	—	—	0.2	0.2	0.1	0.3
Interest cost	12.6	3.1	0.9	1.0	17.6	0.2	17.8
Settlements	—	(5.1)	—	—	(5.1)	—	(5.1)
Remeasurement of liabilities:							
— demographic changes	(5.6)	(0.5)	—	—	(6.1)	—	(6.1)
— financial assumptions	49.4	9.2	9.6	4.3	72.5	0.7	73.2
— experience losses/(gains)	2.6	0.4	(0.3)	(0.3)	2.4	(0.5)	1.9
Benefits paid	(32.9)	(4.6)	(1.6)	(2.4)	(41.5)	(1.1)	(42.6)
Present value as at 31 December 2019	482.0	78.9	54.5	47.5	662.9	6.9	669.8

Following a review of employee benefits £0.6m (2018: £0.6m) of accrued liabilities have been reclassified from the defined benefit obligation into accruals and other payables.

	Defined benefit pension plans					Other post-retirement benefit plans	Total
	UK £m	US £m	Germany £m	ROW £m	Total £m	£m	£m
Present value as at 1 January 2018	490.8	82.0	49.4	44.6	666.8	6.5	673.3
Exchange differences	—	4.5	0.6	0.6	5.7	0.2	5.9
Current service cost	—	0.6	1.5	3.2	5.3	0.6	5.9
Past service cost	4.5	(0.9)	—	(1.0)	2.6	—	2.6
Interest cost	11.9	2.7	0.8	0.7	16.1	0.3	16.4
Settlements	—	—	—	—	—	—	—
Remeasurement of liabilities:							
— demographic changes	(3.2)	(0.3)	0.8	2.0	(0.7)	—	(0.7)
— financial assumptions	(22.1)	(5.3)	(4.6)	(1.7)	(33.7)	0.2	(33.5)
— experience losses/(gains)	2.0	0.1	0.9	(1.6)	1.4	0.1	1.5
Benefits paid	(28.0)	(3.9)	(1.6)	(2.2)	(35.7)	(0.6)	(36.3)
Present value as at 31 December 2018	455.9	79.5	47.8	44.6	627.8	7.3	635.1

26.5 Fair value of plan assets

	2019				2018			
	UK £m	US £m	ROW £m	Total £m	UK £m	US £m	ROW £m	Total £m
As at 1 January	543.8	47.0	29.0	619.8	580.3	49.8	26.7	656.8
Exchange differences	—	(1.8)	(1.7)	(3.5)	—	2.7	0.6	3.3
Interest income	15.1	1.8	0.6	17.5	14.2	1.6	0.5	16.3
Settlements	—	(3.7)	—	(3.7)	—	—	—	—
Acquisitions	—	—	—	—	—	—	—	—
Remeasurement of assets	55.4	9.3	0.7	65.4	(23.0)	(5.0)	0.4	(27.6)
Contributions from employer	0.8	2.0	2.4	5.2	0.8	1.4	2.3	4.5
Contributions from members	—	—	—	—	—	—	—	—
Administration expenses paid	(0.7)	(0.7)	—	(1.4)	(0.6)	(0.6)	—	(1.2)
Benefits paid	(32.8)	(3.6)	(1.6)	(38.0)	(27.9)	(2.9)	(1.5)	(32.3)
As at 31 December	581.6	50.3	29.4	661.3	543.8	47.0	29.0	619.8

The Group's pension plans in Germany are unfunded, as is common practice in that country, and accordingly there are no assets associated with these plans.

26.6 Remeasurement of defined benefit liabilities/assets

	2019 total £m	2018 total £m
Remeasurement of liabilities:		
— demographic changes	6.1	0.7
— financial assumptions	(73.2)	33.5
— experience (losses)/gains	(1.9)	(1.5)
Remeasurement of assets	65.4	(27.6)
Total movement	(3.6)	5.1

The remeasurement of defined benefit liabilities and assets of £3.6m loss (2018: £5.1m gain) is recognised in the Group Statement of Comprehensive Income.

26.7 Balance sheet recognition

The amount recognised in the Group Balance Sheet in respect of the Group's defined benefit pension plans and other post-retirement benefit plans is analysed in the following tables, which all relate to continuing operations. All equity securities and bonds have quoted prices in active markets.

	Defined benefit pension plans					Other post-retirement benefit plans £m	2019 total £m
	UK £m	US £m	Germany £m	ROW £m	Total £m		
Equities	44.2	3.2	—	2.1	49.5	—	49.5
Bonds	229.3	46.3	—	3.3	278.9	—	278.9
Annuity insurance contracts	280.3	—	—	20.4	300.7	—	300.7
Other assets	27.8	0.8	—	3.6	32.2	—	32.2
Fair value of plan assets	581.6	50.3	—	29.4	661.3	—	661.3
Present value of funded obligations	(480.1)	(67.6)	—	(42.8)	(590.5)	—	(590.5)
	101.5	(17.3)	—	(13.4)	70.8	—	70.8
Present value of unfunded obligations	(1.9)	(11.3)	(54.5)	(4.7)	(72.4)	(6.9)	(79.3)
Total net surpluses/(liabilities)	99.6	(28.6)	(54.5)	(18.1)	(1.6)	(6.9)	(8.5)
Recognised in the Group Balance Sheet as:							
Net surpluses	101.5	—	—	1.1	102.6	—	102.6
Net liabilities	(1.9)	(28.6)	(54.5)	(19.2)	(104.2)	(6.9)	(111.1)
Total net surpluses/(liabilities)	99.6	(28.6)	(54.5)	(18.1)	(1.6)	(6.9)	(8.5)

Notes to the Group Financial Statements continued

26. Employee Benefits continued

26.7 Balance sheet recognition continued

	Defined benefit pension plans					Other post-retirement benefit plans £m	2018 total £m
	UK £m	US £m	Germany £m	ROW £m	Total £m		
Equities	49.7	5.1	—	2.3	57.1	—	57.1
Bonds	213.0	40.6	—	2.9	256.5	—	256.5
Annuity insurance contracts	264.1	—	—	19.8	283.9	—	283.9
Other assets	17.0	1.3	—	4.0	22.3	—	22.3
Fair value of plan assets	543.8	47.0	—	29.0	619.8	—	619.8
Present value of funded obligations	(454.1)	(68.2)	—	(40.3)	(562.6)	—	(562.6)
	89.7	(21.2)	—	(11.3)	57.2	—	57.2
Present value of unfunded obligations	(1.8)	(11.3)	(47.8)	(4.3)	(65.2)	(7.3)	(72.5)
Total net surpluses/(liabilities)	87.9	(32.5)	(47.8)	(15.6)	(8.0)	(7.3)	(15.3)
Recognised in the Group Balance Sheet as:							
Net surpluses	89.7	—	—	1.1	90.8	—	90.8
Net liabilities	(1.8)	(32.5)	(47.8)	(16.7)	(98.8)	(7.3)	(106.1)
Total net surpluses/(liabilities)	87.9	(32.5)	(47.8)	(15.6)	(8.0)	(7.3)	(15.3)

(a) (i) UK Plan asset allocation

As at 31 December 2019, of the UK Plan's total assets, 48.2% (2018: 48.6%) were represented by the annuity insurance contracts covering the UK Plan's pension liabilities; 7.6% (2018: 9.1%) were allocated to equities; 39.4% (2018: 39.2%) to fixed income securities; 0.4% (2018: 0.4%) to cash; and 4.4% (2018: 2.7%) to other assets. The fixed income asset class of the UK Plan includes a liability-driven investment portfolio of financial derivative contracts which reduces the risk that the UK Plan's assets would fall materially, relative to the value of its economic liabilities. Of the UK Plan's fixed income securities, £150.3m have a quoted market price in an active market.

The UK Plan Trustee has entered into a pension insurance buy-in agreement with the Pension Insurance Corporation ('PIC'), whereby the UK Plan Trustee has paid insurance premiums to PIC to insure a significant portion of the UK Plan's liabilities. Under this arrangement, the value of the PIC insurance contract matches the value of the liabilities because the inflation, interest rate, investment and longevity risk for Vesuvius in respect of these liabilities are eliminated. As at 31 December 2019, the IAS 19 valuation of the PIC insurance contract value associated with the bought-in liabilities was £280.3m (2018: £264.1m). The buy-in agreement ensures that the UK pension plan obligations in respect of all its retired members and their approved dependents are insured. The policy and the associated valuation are updated annually to reflect retirements and mortality. In the current year, the agreement based on specific membership data covers 58.4% (2018: 58.1%) of UK pension plan obligations, removing substantially all financial risks associated with this tranche of the liability.

(ii) US Plan asset allocation

All of the assets in the main US Plan have a quoted market price in an active market. The Plan mitigates exposure to interest rates by employing a liability matching investment strategy. All non-derivative assets are invested in liability matching bonds with a similar average duration to the liabilities of the Plan. Since 2018, the investment allocation has been de-risked from an allocation of 72% liability matching and 28% return seeking assets, to an allocation of 100% liability matching. The Plan retains equity risk through use of equity derivative contracts, which provides equity market exposure with some level of equity downside protection.

(b) Defined benefit contributions in 2020

In 2020, the Group is expected to make contributions into its defined benefit pension and other post-retirement benefits plans of around £4.6m with specific contributions of approximately £2.2m and £1.6m anticipated for the US Plan and Belgian Plans respectively.

26.8 Income statement recognition

The expense recognised in the Group Income Statement in respect of the Group's defined benefit retirement plans and other post-retirement benefit plans is shown below:

	2019			2018		
	Defined benefit pension plans £m	Other post-retirement benefit plans £m	Total £m	Defined benefit pension plans £m	Other post-retirement benefit plans £m	Total £m
Current service cost	4.1	0.4	4.5	5.3	0.6	5.9
Past service cost	0.2	0.1	0.3	2.6	—	2.6
Settlements	(1.4)	—	(1.4)	—	—	—
Administration expenses	1.4	—	1.4	1.2	—	1.2
Net interest cost/(gain)	0.1	0.2	0.3	(0.2)	0.3	0.1
Total net charge	4.4	0.7	5.1	8.9	0.9	9.8

The total net charge of £5.1m (2018: £9.8m) recognised in the Group Income Statement in respect of the Group's defined benefit pension plans and other post-retirement benefits plans is recognised in the following table:

		2019 £m	2018 £m
In arriving at trading profit	— within other manufacturing costs	1.7	1.5
	— within administration, selling and distribution costs	3.1	3.7
In arriving at profit before tax	— Guaranteed minimum pension equalisation charge	—	4.5
	— within net finance costs	0.3	0.1
Total net charge		5.1	9.8

26.9 Risks to which the defined benefit pension plans expose the Group

The principal risks faced by these plans comprise: (i) the risk that the value of the plan assets is not sufficient to meet all plan liabilities as they fall due; (ii) the risk that plan beneficiaries live longer than envisaged, causing liabilities to exceed the available plan assets; and (iii) the risk that the market-based factors used to value plan liabilities and assets change materially adversely to increase plan liabilities over the value of available plan assets. Further details are given below:

Asset volatility

- > the liabilities are calculated using a discount rate set with reference to corporate bond yields; if assets underperform against this yield, this will create a deficit. To reduce this risk, the pension plans are largely invested in government and corporate bonds.

Counterparty risk

- > There are a number of other risks of running the UK Pension Fund including counterparty risks from using derivatives. These are mitigated by using a diversified range of counterparties of high standing and ensuring positions are collateralised as required.

Changes in bond yields

- > a decrease in corporate bond yields will increase the scheme liabilities, although this will be partially offset by an increase in the value of the schemes' bond holdings.

Inflation risk

- > much of the UK scheme's benefit obligations are linked to inflation and higher inflation will lead to higher liabilities (although, in most cases, caps on the level of inflationary increases are in place to protect against extreme inflation). The UK scheme also holds index-linked government bonds to provide protection against this risk.

Life expectancy

- > the majority of the plans' obligations are to provide benefits for the life of the member and in some cases their spouse on death of the member, so increases in life expectancy will result in an increase in the liabilities.
- > in July 2012 Vesuvius entered into an agreement with the Pension Insurance Corporation (PIC) to insure pensions in payment for the pensioners in the UK main Plan. These annuities are owned by the UK Pension Plan. Further annuity purchases have taken place at regular intervals since then and the plan now holds annuity contracts to cover the majority of pensions in payment thereby removing substantially all risks in respect of these pensions.
- > in August 2016 the pensions for the majority of current pensioners in the US main plan were bought out with an insurance company, removing all responsibility and risk related to these pensions from the Group.
- > in late 2016 and in late 2019 deferred members in the US main Plan were offered lump sums in lieu of their deferred pension benefits, settling the liabilities for those members accepting this offer in full.

Notes to the Group Financial Statements continued

27. Share-based Payments

27.1 Accounting policy

The Group operates equity-settled share-based payment arrangement for its employees. Equity-settled share-based payments are measured at fair value at the date of grant. For grants with market-based conditions attached to them, such as total shareholder return, fair value is measured using a form of stochastic option pricing model. For grants with non-market-based conditions, such as growth in headline earnings per share, fair value is measured using the Black-Scholes option pricing model. The fair value is expensed on a straight-line basis over the vesting period with a corresponding increase in equity. The cumulative expense recognised is adjusted for the best estimate of the shares that will eventually vest.

27.2 Income statement recognition

The total expense recognised in the Group Income Statement is shown below:

	2019 £m	2018 £m
Long Term Incentive Plan	2.5	2.7
Other plans	2.4	1.0
Total expense	4.9	3.7

The Group operates a number of different share-based payment plans, the most significant of which is the Long-Term Incentive Plan (LTIP), details of which can be found in the Directors' Remuneration Report.

27.3 Details of outstanding options

	Outstanding awards					As at 31 Dec 2019 no.
	As at 1 Jan 2019 no.	Granted no.	Exercised no.	Forfeited/ lapsed no.	Expired no.	
LTIP	2,360,478	654,534	(1,048,487)	(133,305)	nil	1,833,220
Weighted average exercise price	nil	nil	nil	nil	nil	nil
Other plans	298,890	563,715	(176,183)	(1,323)	nil	685,099
Weighted average exercise price	nil	nil	nil	nil	nil	nil

For the options exercised during 2019, the market value at the date of exercise ranged from 418 pence to 625 pence.

	Outstanding awards					As at 31 Dec 2018 no.
	As at 1 Jan 2018 no.	Granted no.	Exercised no.	Forfeited/ lapsed no.	Expired no.	
LTIP	2,280,093	647,188	(247,688)	(319,115)	nil	2,360,478
Weighted average exercise price	nil	nil	nil	nil	nil	nil
Other plans	152,437	228,855	(77,577)	(4,825)	nil	298,890
Weighted average exercise price	nil	nil	nil	nil	nil	nil

For the options exercised during 2018, the market value at the date of exercise ranged from 569 pence to 619 pence.

Details of market performance conditions are included in the Directors' Remuneration Report.

	2019			2018		
	Awards exercisable as at 31 Dec 2018 no.	Weighted average outstanding contractual life of awards years	Range of exercise prices pence	Awards exercisable as at 31 Dec 2017 no.	Weighted average outstanding contractual life of awards years	Range of exercise prices pence
LTIP	—	7.0		—	5.5	
Weighted average exercise price	—		n/a	—		n/a
Other plans	—	1.0		—	1.0	
Weighted average exercise price	—		n/a	—		n/a

27.4 Options granted under the LTIP during the year

	2019	
	EPS element	TSR element
Fair value of options granted	608p	379p
Share price on date of grant	608p	608p
Expected volatility	n/a	30.6%
Risk-free interest rate	n/a	0.9%
Exercise price (per share)	nil	nil
Expected term (years)	3	3
Expected dividend yield	nil	nil

Vesting of 50% of shares awarded is based on the Group's three-year TSR performance relative to that of the constituent companies of the FTSE 250 (excluding investment trusts) and vesting of the remaining 50% of shares awarded is based on headline EPS growth.

Expected volatility was determined by calculating the historical volatility of the Group's share price over the 2.8 years (2018: 2.8 years) prior to the grant date for the March 2019 grant. The risk-free rate of return was assumed to be the yield to maturity on a UK fixed gilt with the term to maturity equal to the expected life of the option. At the discretion of the Remuneration Committee, award holders receive the value of dividends that would have been paid on their vested shares in the period between grant and vesting. Accordingly, there is no discount to the valuation for dividends foregone during the vesting period.

28. Trade and Other Payables**28.1 Accounting policy**

Trade and other payables are initially recognised at fair value and subsequently measured at amortised cost, using the effective interest method.

28.2 Analysis of trade and other payables

	2019 £m	2018 £m
Non-current		
Accruals and other payables	14.7	15.5
Deferred purchase and contingent consideration	0.4	0.6
Total non-current other payables	15.1	16.1
Current		
Trade payables	173.8	197.3
Other taxes and social security	29.9	35.3
Deferred purchase and contingent consideration	1.5	1.9
Accruals and other payables	68.4	77.3
Total current trade and other payables	273.6	311.8

There is no significant difference between the fair value of the Group's trade and other payables balances and the amount at which they are reported in the Group Balance Sheet.

Included within trade payables in the table above is £8.0m (2018: £4.1m) subject to a supplier financing agreement entered into with one of the Group's core relationship banks. Under the terms of the agreement, the Group's suppliers in certain countries can elect to be paid earlier than the terms of their agreement with Vesuvius by requesting discounted early settlement from the arranging bank. This early settlement is effected between the bank and the supplier; from the perspective of the Group the terms of each payable remain unchanged. The Group is not charged any interest cost or fee in respect of the agreement.

Notes to the Group Financial Statements continued

29. Leases

29.1 Accounting policy

The Group has adopted IFRS 16 Leases from 1 January 2019 and, in accordance with the simplified approach, has not restated comparatives on transition. The reclassifications and adjustments arising from the new lease accounting rules are therefore recognised in the opening balance sheet on 1 January 2019. The impact of the adoption is disclosed in Note 2.6.

Lease liabilities are recognised at the present value of the remaining lease payments, discounted using the interest rate implicit in the lease if that rate could be readily determined. If that rate cannot be readily determined the lessee's incremental borrowing rate was used, calculated as the local government bond rate plus an interest rate spread. In cases where there was an option to terminate or extend a lease, the duration of the lease assumed for this purpose reflected the Group's existing intentions regarding such options. Lease liabilities include the net present value of the following lease payments:

- > fixed payments (including in-substance fixed payments), less any lease incentives receivable
- > variable lease payments that are based on an index or a rate
- > amounts expected to be payable by the lessee under residual value guarantees
- > the exercise price of a purchase option if the lessee is reasonably certain to exercise that option, and
- > payments of penalties for terminating the lease, if the lease term reflects the lessee exercising that option.

Leases of low-value assets and short-term leases (shorter than 12 months) are classified as operating leases and neither the asset nor the corresponding liability to the lessor is recognised in the Group Balance Sheet. Rentals payable under operating leases are charged to the Group Income Statement on a straight-line basis over the term of the lease. Benefits received and receivable as an incentive to enter an operating lease are also spread on a straight-line basis over the lease term.

29.2 Lease liabilities

The maturity analysis of the lease liabilities is disclosed in Note 25 (d).

The net book value of the Group's property, plant and equipment assets held as right of use assets under lease contracts at 31 December 2019 was £34.4m (2018: £4.4m). The right-of-use asset is depreciated over the shorter of the asset's useful life and the lease term on a straight-line basis. The cash repayments of leases during the year were £13.3m (2018: £2.4m).

29.3 Operating lease commitments

The future aggregate minimum lease payments under non-cancellable operating leases are payable as follows:

	2019 £m	2018 £m
Not later than one year	1.3	11.6
Later than one year and not later than five years	0.6	19.2
Later than five years	0.1	8.5
Total operating lease commitments	2.0	39.3

The cost incurred by the Group in the year in respect of assets held under operating leases, all of which was charged within trading profit, amounted to £6.0m (2018: £20.9m).

30. Provisions

30.1 Accounting policy

Provisions are recognised when the Group has a present obligation as a result of a past event and it is probable that the Group will be required to settle that obligation. Provisions are measured at the Directors' best estimate of the expenditure required to settle the obligation at the balance sheet date. Where the effect of the time value of money is material, provisions are discounted using a pre-tax discount rate that reflects both the current market assessment of the time value of money and the specific risks associated with the obligation. Where discounting is used, the increase in the provision due to the passage of time is recognised as a finance cost.

30.2 Analysis of provisions

	Disposal and closure costs £m	Restructuring charges £m	Other £m	Total £m
As at 1 January 2019	39.8	17.4	4.7	61.9
Exchange adjustments	(1.2)	(1.0)	(0.1)	(2.3)
Charge to Group Income Statement	4.1	39.8	8.4	52.3
Unused amounts released to Group Income Statement	(0.2)	—	—	(0.2)
Adjustment to discount	1.3	—	—	1.3
Cash spend	(9.0)	(30.0)	(10.1)	(49.1)
Transferred to other balance sheet accounts	—	(7.1)	—	(7.1)
As at 31 December 2019	34.8	19.1	2.9	56.8

Of the total provision balance as at 31 December 2019 of £56.8m (2018: £61.9m), £31.1m (2018: £38.8m) is recognised in the Group Balance Sheet within non-current liabilities and £25.7m (2018: £23.1m) within current liabilities.

The provision for disposal and closure costs includes the Directors' current best estimate of the costs to be incurred both in the fulfilment of obligations incurred in connection with former Group businesses, resulting from either disposal or closure, together with those related to the demolition and clean-up of closed sites. The provision comprises amounts payable in respect of known or probable costs resulting both from legal or other regulatory requirements, or from third-party claims, including claims relating to product liability. As the settlement of many of the obligations for which provision is made is subject to legal or other regulatory process, the timing of the associated cash outflows is subject to some uncertainty, but the majority of the amounts provided are expected to be utilised over the next ten years and the underlying estimates of costs are regularly updated to reflect changed circumstances with regard to individual matters.

Where insurance cover exists for any of these known or probable costs, a related asset is recognised in the Group Balance Sheet only when its value can be reliably measured and reimbursement is considered to be virtually certain by management. As at 31 December 2019, £16.4m (2018: £21.5m) was recorded in other receivables in respect of associated insurance reimbursements, of which £14.3m (2018: £17.7m) is non-current.

In assessing the probable costs and realisation certainty of provisions, or related assets, reasonable assumptions are made including projections of the number of claims and the approximate average cost of those claims. By nature, these assumptions are uncertain and therefore changes to the assumptions used could significantly alter the Directors' assessment of the value, volume of claims, timing or certainty of the costs or related amounts.

The provision for restructuring charges includes the costs of all of the Group's recognised initiatives to rationalise its operating activities. The balance of £19.1m as at 31 December 2019, (2018: £17.4m) comprises £nil (2018: £4.3m) in relation to onerous lease provisions in respect of leases terminating between one and six years, and £19.1m (2018: £13.1m) in relation to expenditure on restructuring initiatives that have been announced the majority of which is expected to be paid out over the next year.

Other provisions comprise amounts payable in respect of known or probable costs resulting both from legal or other regulatory requirements, workers' compensation and medical claims, and from third-party claims. As the settlement of many of the obligations for which provision is made is subject to reasonable assumptions, legal or other regulatory process, the timing of the associated outflows is subject to some uncertainty, but the majority of amounts provided are expected to be utilised over the next five years and the underlying estimates of costs are regularly updated to reflect changed circumstances with regard to individual matters. During 2019 the Group recognised net charges of £8.4m (2018: £9.3m) in the Group Income Statement to provide for various litigation settlements and other claims.

31. Off-Balance Sheet Arrangements

In compliance with current reporting requirements, certain arrangements entered into by the Group in its normal course of business are not reported in the Group Balance Sheet. Of such arrangements, those considered material by the Directors are future lease payments in relation to assets used by the Group under non-cancellable operating leases (Note 29).

Notes to the Group Financial Statements continued

32. Contingent Liabilities

Guarantees given by the Group under property leases of operations disposed of amounted to £0.3m (2018: £0.8m). Details of guarantees given by the Company, on behalf of the Group, are given in Note 11 to the Company Financial Statements.

Vesuvius has extensive international operations and is subject to various legal and regulatory regimes, including those covering taxation and environmental matters. Several of Vesuvius' subsidiaries are parties to legal proceedings, certain of which are insured claims arising in the ordinary course of the operations of the company involved, and the Directors are aware of a number of issues which are, or may be, the subject of dispute with tax authorities. Provisions are made for the expected amounts payable in respect of known or probable costs resulting both from legal or other regulatory requirements, and from third-party claims.

Certain of Vesuvius' subsidiaries are subject to lawsuits, predominantly in the US, relating to a small number of products containing asbestos manufactured prior to the acquisition of those subsidiaries by Vesuvius. These suits usually also name many other product manufacturers. To date, Vesuvius is not aware of there being any liability verdicts against any of these subsidiaries. A number of lawsuits have been withdrawn, dismissed or settled and the amount paid, including costs, in relation to this litigation has not had a material adverse effect on Vesuvius' financial position or results of operations.

As the settlement of many of the obligations for which reserve is made is subject to legal or other regulatory process, the timing and amount of the associated outflows is subject to some uncertainty (see Note 30 for further information).

33. Investments in Subsidiaries, Joint Ventures and Associates

33.1 Investment in subsidiaries

A subsidiary is an entity over which the Group has control. The Group controls an entity when the Group is exposed to, or has rights to, variable returns from its involvement with the entity and can affect those returns through its power over the entity. Subsidiaries are fully consolidated from the date on which control is transferred to the Group.

The subsidiaries, joint ventures and associates of Vesuvius plc and the countries in which they are incorporated are set out below. With the exception of Vesuvius Holdings Limited, whose ordinary share capital was directly held by Vesuvius plc, the ordinary capital of the companies listed below was wholly owned by a Vesuvius plc subsidiary as at 31 December 2019.

Company legal name	Registered office address	Jurisdiction	Company legal name	Registered office address	Jurisdiction
Advent Process Engineering Inc.	333 Prince Charles Drive, Welland, Ontario, L3B 5P4, Canada	Canada (Ontario)	Foseco (RUL) Limited	165 Fleet Street, London, EC4A 2AE, England	England
BMI Refractory Services Inc.	600 N 2nd Street, Suite 401, Harrisburg, PA 17101-1071, United States	US (Pennsylvania)	Foseco (UK) Limited	165 Fleet Street, London, EC4A 2AE, England	England
Brazil 1 Limited	165 Fleet Street, London, EC4A 2AE, England	England	Foseco Canada Limited	181 Bay Street, Suite 1800, Toronto, Ontario, M5J 2T9, Canada	Canada (Ontario)
CCPI Inc.	Suite 201, 910 Foulk Road, Wilmington, New Castle, Delaware, 19803, United States	US (Delaware)	Foseco Espanola SA	5, Barrio Elizalde, Izurza, Bizkaia, 48213, Spain	Spain
Cookson Dominicana, SRL	Km 7 1/2, Autopista San Isidro, Edificio Modelo A, Zona Franca San Isidro, Santo Domingo Oeste, Dominican Republic	Dominican Republic	Foseco Foundry (China) Co Limited	Room 819, Shekou Zhaoshang Building, Nanshan District, Shenzhen, Guangdong, 518067, China	China
Cookson Investments (Jersey) Limited	IFC5, St Helier, JE1 1ST, Jersey	Jersey	Foseco Fundación Holding (Espanola), S.L.	5, Barrio Elizalde, Izurza, Bizkaia, 48213, Spain	Spain
East Moon Investment (HK Holding) Company Limited	Unit 01, 82/F, International Commerce Centre, 1 Austin Road West, Kowloon, Hong Kong	Hong Kong	Foseco Holding (Europe) Limited	165 Fleet Street, London, EC4A 2AE, England	England
Flo-Con Holding, Inc.	CT Corporation, 1209 Orange Street, The Corporation Trust Company, Wilmington, DE 19801, United States	US (Delaware)	Foseco Holding (South Africa) (Pty) Limited	12, Bosworth Street, Alrode, Alberton, 1449, South Africa	South Africa
Foseco (FS) Limited	1 Midland Way, Central Park, Barlborough Links, Derbyshire, S43 4XA, England	England	Foseco Holding BV	165 Fleet Street, London, EC4A 2AE, England (Branch registration)	Netherlands
Foseco (GB) Limited	165 Fleet Street, London, EC4A 2AE, England	England	Foseco Holding International Limited	165 Fleet Street, London, EC4A 2AE, England	England
Foseco (Jersey) Limited	44 Esplanade, St Helier, JE4 9WG, Jersey	Jersey	Foseco Holding Limited	165 Fleet Street, London, EC4A 2AE, England	England
Foseco (MRL) Limited	165 Fleet Street, London, EC4A 2AE, England	England	Foseco Industrial e Comercial Ltda	Km 15, Rodovia Raposo Tavares, Butanta Cep, São Paulo, 05577-100, Brazil	Brazil
			Foseco International Holding (Thailand) Limited	170/69, 22nd Floor Ocean Tower 1, Ratchadapisek Road, Klongtoey, Bangkok, 10110, Thailand	Thailand

Company legal name	Registered office address	Jurisdiction
Foseco International Limited	1 Midland Way, Central Park, Barlborough Links, Derbyshire, S43 4XA, England	England
Foseco Japan Limited	9th Floor, Orix Kobe Sannomiya Building, 6-1-10, Goko dori, Chuo-ku, Kobe Hyogo, 651-0087, Japan	Japan
Foseco Korea Limited	74 Jeongju-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do, 14523, South Korea	South Korea
Foseco Limited	165 Fleet Street, London, EC4A 2AE, England	England
Foseco Metallurgical Inc.	CT Corporation, 1209 Orange Street, The Corporation Trust Company, Wilmington, DE 19801, United States	US (Delaware)
Foseco Nederland BV	Binnenhavenstraat 20, 7553 GJ Hengelo (OV), Netherlands	Netherlands
Foseco Overseas Limited	165 Fleet Street, London, EC4A 2AE, England	England
Foseco Pension Fund Trustee Limited	165 Fleet Street, London, EC4A 2AE, England	England
Foseco Philippines Inc.	Unit 401, 4th Floor 8 Antonio Centre, Prime St. Madrigal Business Park 2, Ayala Alabang Muntinlupa City, 1770 Philippines	Philippines
Foseco Portugal Produtos Para Fundição Lda	Rua Manuel Pinto de Azevedo, No 626 4100-320 Porto, Portugal	Portugal
Foseco Pty Limited	40-46 Gloucester Boulevard, Port Kembla, NSW, 2505, Australia	Australia
Foseco SAS	Le Newton C, 7 Mail Barthélémy Thimonnier, 77185 Lognes, France	France
Foseco Steel (Holdings) China Limited	165 Fleet Street, London, EC4A 2AE, England	England
Foseco Steel (UK) Limited	1 Midland Way, Central Park, Barlborough Links, Derbyshire, S43 4XA, England	England
Foseco Technology Limited	165 Fleet Street, London, EC4A 2AE, England	England
Foseco Transnational Limited	165 Fleet Street, London, EC4A 2AE, England	England
HGAC Participações Limitada	Street Duque de Caxias, 563 Room 2, Centro, Barueri, SP, 06401-010, Brazil	Brazil
J.H. France Refractories Company	CT Corporation, 1209 Orange Street, The Corporation Trust Company, Wilmington, DE 19801, United States	US (Delaware)
John G. Stein & Company Limited	1 Midland Way, Central Park, Barlborough Links, Derbyshire, S43 4XA, England	England
Mainsail Insurance Company Limited	Canon's Court, 22 Victoria Street, Hamilton, HM 12, Bermuda	Bermuda
Mascinco Empreendimentos e Participações Ltda	Avenida Brasil, 49550 – parte, Distrito Industrial de Palmares – Campo, Grande – Cep: 23065-480, Rio de Janeiro, RJ, Brazil	Brazil
Mastercodi Industrial Ltda	Rodovia Raposo Tavares, KM15, Butantã, 05577-100, Butantã, São Paulo, Brazil	Brazil
Mercajoya, S.A.	Capitán Haya, 56 – 1ºH, 28020 Madrid, Spain	Spain

Company legal name	Registered office address	Jurisdiction
Metal Way Equipamentos Metalurgicos Ltda	Estrada Santa Isabel, 7655 KM37, Bairro Do Una, Itaquaquecetuba, São Paulo – SP, CEP: 08580 000, Brazil	Brazil
Micro Jewels Limited	10 Frere Felix, De Valois Street, Port Louis, Mauritius	Mauritius
Minerals Separation Limited	165 Fleet Street, London, EC4A 2AE, England	England
New Foseco (UK) Limited	1 Midland Way, Central Park, Barlborough Links, Derbyshire, S43 4XA, England	England
Process Metrix, LLC	6622 Owens Drive, Pleasanton, CA 94588, United States	US (California)
PT Foseco Indonesia	Jl Rawa Gelam 2/5, Kawasan Industri, Pulogadung, Jakarta, 13930, Indonesia	Indonesia
PT Foseco Trading Indonesia	Jl Rawa Gelam 2/5, Kawasan Industri, Pulogadung, Jakarta, 13930, Indonesia	Indonesia
Realisations 789, LLC	CT Corporation, 1209 Orange Street, The Corporation Trust Company, Wilmington, DE 19801, United States	US (Delaware)
S G Blair & Company Limited	1 Midland Way, Central Park, Barlborough Links, Derbyshire, S43 4XA, England	England
SERT-Metal SAS	3, Avenue de l'Europe, Parc, Les Pivrolles, Decines-Charpieu 69150, France	France
SIDERMES Inc.	175, Calixa-Lavallée Verchères, Québec J0L2R0, Canada	Canada
SIDERMES Do Brasil Sensores Termicos Ltda	Estrada Municipal PDD 436, S/N, Prédio 'C', Bairro da Boa Vista, Municipio de Piedade, Estado de São Paulo, Brazil	Brazil
SIDERMES Latinoamericana CA	Zona Industrial, San Vicente Av., Anton Phillips Grupo Industrial, San Vicente Local 4, Maracay, Venezuela	Venezuela
SIDERMES S.A.	Urquiza 919 Piso 2 Rosario, Santa Fe, Argentina CP 2000, Argentina	Argentina
SIR Feuerfestprodukte GmbH	Siegener Strasse 152, Kreuztal, D-57223, Germany	Germany
SOLED SAS	Centre d'Activités Economiques Zone Industrielle de Franchepré 54240 Joeuf, France	France
Tamworth UK Limited	165 Fleet Street, London, EC4A 2AE, England	England
Unicorn Industries Limited	165 Fleet Street, London, EC4A 2AE, England	England
Veservice Ltda	Av Brasil, 49550, Distrito Industrial de Palmares, Campo Grande, Rio de Janeiro, 23065-480, Brazil	Brazil
Vesuvius (Thailand) Co., Limited	170/69, 22nd Floor Ocean Tower 1, Ratchadapisek Road, Klongtoey, Bangkok, 10110, Thailand	Thailand
Vesuvius (V.E.A.R.) S.A.	Street Urquiza, 919, Floor 2, Rosario, Provincia de Santa Fé, Argentina	Argentina
Vesuvius Advanced Ceramics (China) Co., Limited	221 Xing Ming Street, China-Singapore Suzhou Ind Park, Suzhou, Jiangsu Province, 215021, China	China

Notes to the Group Financial Statements continued

33. Investments in Subsidiaries, Joint Ventures and Associates continued

33.1 Investment in subsidiaries continued

Company legal name	Registered office address	Jurisdiction	Company legal name	Registered office address	Jurisdiction
Vesuvius America, Inc.	1209 Orange Street, Wilmington, DE 19801, United States	US (Delaware)	Vesuvius Investments Limited	165 Fleet Street, London, EC4A 2AE, England	England
Vesuvius Australia (Holding) Pty Limited	40-46 Gloucester Boulevard, Port Kembla, NSW, 2505, Australia	Australia	Vesuvius Istanbul Refrakter Sanayi ve Ticaret AS	Gebze OSB2 Mh. 1700., Sok No:1704/1, Cayirova, Kocaeli, 41420, Turkey	Turkey
Vesuvius Australia Pty Limited	40-46 Gloucester Boulevard, Port Kembla, NSW, 2505, Australia	Australia	Vesuvius Italia SPA	Piazza Borgo Pila 40, Genoa, 16129, Italy	Italy
Vesuvius Belgium N.V.	Zandvoordestraat 366, Oostende, B-8400, Belgium	Belgium	Vesuvius Japan Inc.	Daini-Naruse Akihabara Bldg. 3F, 27-10, 1-chome, Taito, Taito-ku, Tokyo, 110-0016, Japan	Japan
Vesuvius Canada Inc	181 Bay Street, Suite 1800, Toronto, Ontario, M5J 2T9, Canada	Canada	Vesuvius K.S.R. Limited	1 Midland Way, Central Park, Barlborough Links, Derbyshire S43 4XA, England	England
Vesuvius Ceramics Limited	165 Fleet Street, London, EC4A 2AE, England	England	Vesuvius Life Plan Trustee Limited	165 Fleet Street, London, EC4A 2AE, England	England
Vesuvius China Holdings Co. Limited	Unit 01, 82/F International Commerce Centre, 1 Austin Road West, Kowloon, Hong Kong	Hong Kong	Vesuvius LLC	10, Ul. Kooperativnaya, Zhukovsky, Moscow, 140180, Russian Federation	Russia
Vesuvius China Limited	165 Fleet Street, London, EC4A 2AE, England	England	Vesuvius Malaysia Sdn Bhd	Unit 30-01, Level 30 Tower A, Vertical Business Suite Avenue 3, Bangsar South, No 8 Jalan Kirinchi, Kuala Lumpur Wilayah Persekutuan, 59200, Malaysia	Malaysia
Vesuvius Colombia SAS	Street 90, number 13 A – 31, floor 6, Bogota, Colombia	Colombia	Vesuvius Management Limited	165 Fleet Street, London, EC4A 2AE, England	England
Vesuvius Corporation S.A.	Via Nassa 17, Lugano, CH 6900, Switzerland	Switzerland	Vesuvius Management Services Limited	165 Fleet Street, London, EC4A 2AE, England	England
Vesuvius CSD Sp z.o.o.	ul. Jasnogórska 11, Kraków, 31-358, Poland	Poland	Vesuvius Mexico S.A. de C.V.	Av. Ruiz Cortinez, Num. 140, Colonia Jardines de San Rafael, Guadalupe, Nuevo León, CP 67119, Mexico	Mexico
Vesuvius Emirates FZE	Warehouse No: 1J-09/3, PO Box 49261, Hamriyah Free Zone, Sharjah, United Arab Emirates	United Arab Emirates	Vesuvius Mid-East Limited	56, rd 15, Apt 103, Maadi, Cairo, Egypt	Egypt
Vesuvius Europe S.A.	17 Rue de Douvrain, Ghlin, 7011, Belgium	Belgium	Vesuvius Minerals Limited	165 Fleet Street, London, EC4A 2AE, England	England
Vesuvius Financial 1 Limited	165 Fleet Street, London, EC4A 2AE, England	England	Vesuvius Moravia, s.r.o.	Konska c.p. 740, Trinec, 739 61, Czech Republic	Czech Republic
Vesuvius Finland OY	Pajamäentie 8D7, 00360 Helsinki, Finland	Finland	Vesuvius NC, LLC.	Suite 201, 910 Foulk Road, Wilmington, New Castle, Delaware, 19803, United States	US (Delaware)
Vesuvius Foundry Products (Suzhou) Co., Limited.	12 Wei Wen Road, China-Singapore Suzhou Ind Park, Suzhou, Jiangsu Province, 215122, China	China	Vesuvius New Zealand Limited	Bell Gully, Level 22, Vero Centre, 48 Shortland Street, Auckland, 1010 New Zealand	New Zealand
Vesuvius Foundry Technologies (Jiangsu) Co. Limited	2 Changchun Road, Economic Development Area, Changshu, Jiangsu, 215537, China	China	Vesuvius Overseas Investments Limited	165 Fleet Street, London, EC4A 2AE, England	England
Vesuvius France S.A.	Rue Paul Deudon 68, Boite Postale 19, Feignies 59750, France	France	Vesuvius Overseas Limited	165 Fleet Street, London, EC4A 2AE, England	England
Vesuvius GmbH	Gelsenkirchener Strasse 10, Borken, D-46325, Germany	Germany	Vesuvius Pension Plans Trustees Limited	165 Fleet Street, London, EC4A 2AE, England	England
Vesuvius Group Limited	165 Fleet Street, London, EC4A 2AE, England	England	Vesuvius Peru SAC	Jiron Saenz Pena 185, Magdalena del Mar, Lima, Peru	Peru
Vesuvius Group S.A.	17 Rue de Douvrain, Ghlin, 7011, Belgium	Belgium	Vesuvius Pigments (Holdings) Limited	165 Fleet Street, London, EC4A 2AE, England	England
Vesuvius Holding Deutschland GmbH	Gelsenkirchener Strasse 10, Borken, D-46325, Germany	Germany	Vesuvius Poland Sp z.o.o.	Ul Tyniecka 12, Skawina, 32-050, Poland	Poland
Vesuvius Holding France S.A.S	68 Rue Paul Deudon, BP 19, Feignies 59750, France	France	Vesuvius Ras Al Khaimah FZ-LLC	Street No. F14, RAK Investment Authority Free Zone, Al Hamra, Ras Al Khaimah, PO Box 86408, United Arab Emirates	United Arab Emirates
Vesuvius Holding Italia – Società a Responsabilità Limitata	Piazza Borgo Pila 40, Genoa, 16129, Italy	Italy	Vesuvius Refractories de Chile SA	Street San Martin 870, Room 308, Tower B, Concepcion, Chile	Chile
Vesuvius Holdings Limited	165 Fleet Street, London, EC4A 2AE, England	England			
Vesuvius Ibérica Refractorios S.A.	Capitán Haya, 56 – 1ºH, 28020 Madrid, Spain	Spain			
Vesuvius International Corporation	CT Corporation, 1209 Orange Street, The Corporation Trust Company, Wilmington, DE 19801, United States	US (Delaware)			

Company legal name	Registered office address	Jurisdiction	Company legal name	Registered office address	Jurisdiction
Vesuvius Refractories S.r.l.	Galati, Marea Unire avenue 107, Galati county, 800329, Romania	Romania	Vesuvius USA Corporation	CT Corporation, 208 South LaSalle Street, Chicago, Cook County, IL 60604, United States	US (Illinois)
Vesuvius Refratários Ltda	Av Brasil, 49550, Distrito Industrial de Palmares, Campo Grande, Rio de Janeiro, 23065-480, Brazil	Brazil	Vesuvius VA Limited	165 Fleet Street, London, EC4A 2AE, England	England
Vesuvius Refractory India Private Limited	Room No. 9, 3rd Floor, 7 Ganesh Chandra Avenue, Kolkata, WB 700013, India	India	Vesuvius Vietnam Limited	VP 26, 26th Floor, Song Da-Ha Dong Building, No. 110 Tran Phu, Mo Lao Ward, Ha Dong District, Ha Noi City, Vietnam	Vietnam
Vesuvius Scandinavia AB	4, Forradsgatan, Amal, S-662 34, Sweden	Sweden	Vesuvius Zyalons Holdings Limited	Brown Street, Newmilns, Ayrshire, KA16 9AG, Scotland	Scotland
Vesuvius Sensors & Probes Europe S.p.A.	10 Via Mantova, Muggio, Monza e Brianza, 20835, Italy	Italy	Vesuvius Zyarock Ceramics (Suzhou) Co., Limited	58, KuaChun Road, Kua Tang, China-Singapore Suzou Ind Park, Suzhou, Jiangsu Province, 215122, China	China
Vesuvius Solar Crucible (Suzhou) Co., Ltd.	58, KuaChun Road, Kua Tang, China-Singapore Suzou Ind Park, Suzhou, Jiangsu Province, 215122, China	China	Vesuvius-Premier Refractories (Holdings) Limited	1 Midland Way, Central Park, Barlborough Links, Derbyshire, S43 4XA, England	England
Vesuvius South Africa (Pty) Limited	Pebble Lane, Private Bag X2, Olifantsfontein, Gauteng Province, 1665, South Africa	South Africa	Vesv Distribution (Private) Limited	R Tech Park, 13th Floor Western Express Highway, Goregaon (East) Mumbai, Mumbai City, MH 400063, India	India
Vesuvius Sp z o.o.	ul. Jasnogórska 11, Kraków, 31-358, Poland	Poland	VSV Advanced Ceramics (Anshan) Co., Limited	Xiaotaizi Village, Ningyuan Town, Qianshan District, Anshan, Liaoning Province, 114011, China	China
Vesuvius SSC Sp z o.o.	ul. Jasnogórska 11, Kraków, 31-358, Poland	Poland	Wilkes-Lucas Limited	165 Fleet Street, London, EC4A 2AE, England	England
Vesuvius UK Limited	1 Midland Way, Central Park, Barlborough Links, Derbyshire, S43 4XA, England	England	Yingkou Bayuquan Refractories Co., Limited	Cui Tun Village, Hai Dong Office, Bayuquan District, Liaoning Province, Yingkou, 115007, China	China
Vesuvius Ukraine LLC	27, Udarnykv Street, City of Dnipropetrovsk, 49000, Ukraine	Ukraine			

The following subsidiary companies have branches registered in the named countries: Foseco (Jersey) Limited in England, Foseco Holding BV in England, Vesuvius LLC in Kazakhstan, and Vesuvius UK Limited in Taiwan and South Korea.

33.2 Investment in joint ventures and associates

A joint venture is a type of joint arrangement whereby the parties that have joint control of the arrangement have rights to the net assets of the joint venture. Joint control is the contractually agreed sharing of control of the arrangement, which exists only when decisions about the relevant activities require unanimous consent of the parties sharing control. An associate is an entity over which the Group has significant influence. Significant influence is the power to participate in the financial and operating policy decisions of an entity, but is not control or joint control over those policies.

The Group's investments in its associates and joint ventures are accounted for using the equity method from the date significant influence/joint control is deemed to arise until the date on which significant influence/joint control ceases to exist or when the interest becomes classified as an asset held for sale. The Group Income Statement reflects the Group's share of profit after tax of the related associates and joint ventures. Investments in associates and joint ventures are carried in the Group Balance Sheet at cost adjusted in respect of post-acquisition changes in the Group's share of net assets, less any impairment in value. None of the joint ventures or associates are deemed individually to be material to the Group's results.

In June 2019 Vesuvius completed the sale of its 50% interest in Angang Vesuvius Refractory Company, Limited. Further details are provided in Note 20.

	2019 £m	2018 £m
At 1 January	19.1	17.5
Additions	—	—
Disposals	(6.9)	—
Share of post-tax profit of joint ventures	1.0	2.8
Dividends received from joint ventures	(0.1)	(1.2)
Foreign exchange	(0.4)	—
At 31 December	12.7	19.1

Notes to the Group Financial Statements continued

33. Investments in Subsidiaries, Joint Ventures and Associates continued

33.2 Investment in joint ventures and associates continued

Joint ventures

Set out below is the summarised financial information in respect of joint ventures. Amounts relate to the Group's share.

	2019 £m	2018 £m
Revenue	25.4	75.3
Trading profit	1.3	3.4
Net finance costs	0.1	0.3
Profit before tax	1.4	3.7
Income tax expense	(0.4)	(0.9)
Profit after tax	1.0	2.8
Non-current assets	3.8	4.2
Current assets	9.7	53.9
Non-current liabilities	—	—
Current liabilities	(1.8)	(39.8)
Net assets	11.7	18.3

The purpose of the Chinese joint venture companies is to research, develop, manufacture and sell refractory products. The role of Vesuvius is to provide technical personnel, training and access to the Group's international sales network.

Name of entity	Registered address	Jurisdiction	2019 % ownership	2018 % ownership
Wuhan Wugang-Vesuvius Advanced CCR Co., Limited	Gongnong Village Qingshan District, Wuhan, Hubei Province, 430082, China	China	50	50
Wuhan Wugang-Vesuvius Advanced Ceramics Co., Limited	Gongnong Village Qingshan District, Wuhan, Hubei Province, 430082, China	China	50	50

Associates

Name of entity	Registered address	Jurisdiction	% ownership
Sapotech Oy	Paavo Havaksentie 5 D, 90570 Oulu, Finland	Finland	14.90
Newshelf 480 Proprietary Limited	44 Main Street, Johannesburg, 2001, South Africa	South Africa	45

The Group is considered to hold significant influence over Sapotech Oy despite holding less than 20% of its shares because the agreement under which the Group invested in Sapotech Oy provides that the Group holds one of the four seats on the company's board. This allows the Group to participate in policy-making processes and have additional controls over Sapotech Oy's major decision-making that do not amount to control but give significant influence.

33.3 Non-controlling interests

Non-controlling interests represent the portion of the equity of a subsidiary not attributable either directly or indirectly to the parent company and are presented separately in the Group Income Statement and within equity in the Group Balance Sheet, distinguished from parent company shareholders' equity.

The total profit attributable to non-controlling interest at 31 December 2019 is £6.2m (2018: £6.8m) of which £4.1m relates to Vesuvius India Limited (2018: £4.4m). The profit attributable to non-controlling interests in respect of the Group's other subsidiaries are not considered to be material.

Name of entity	Registered address	Jurisdiction	2019 % ownership	2018 % ownership
Vesuvius India Limited	P-104 Taratala Road, Kolkata, 700 088, India	India	55.57	55.57
Foseco India Limited	922/923, Gat, Sanaswadi, Taluka, Shirur, Pune, 412208, India	India	74.98	74.98
Foseco Golden Gate Company Limited	6 Kung Yeh 2nd Road, Ping Tung Dist, Ping Tung, 90049, Taiwan	Taiwan	51	51
Foseco (Thailand) Limited	170/69, 22nd Floor Ocean Tower 1, Ratchadapisek Road, Klongtoey, Bangkok, 10110, Thailand	Thailand	74	74
Vesuvius Ceska Republika, a.s.	Prumyslová 726, Kanská, Trinec, 739 61, Czech Republic	Czech Republic	60	60

As with Vesuvius plc, all of the above companies have a 31 December year-end. The summarised financial information for Vesuvius India Limited is presented below:

	2019 £m	2018 £m
Summarised balance sheet		
Current assets	85.4	85.3
Current liabilities	(15.6)	(18.4)
<i>Current net assets</i>	69.8	66.9
Non-current assets	16.7	17.1
Non-current liabilities	(1.9)	(1.5)
<i>Non-current net assets</i>	14.8	15.6
Net assets	84.6	82.5
Accumulated NCI	37.9	(36.9)
Summarised statement of comprehensive income		
Revenue	98.3	100.7
Profit after tax	9.4	10.0
Profit allocated to NCI	4.2	4.4
Dividends paid to NCI	(0.7)	(0.7)
Summarised cash flows		
Cash flows from operating activities	10.4	12.6
Cash flows from investing activities	(3.5)	(2.6)
Cash flows from financing activities	(1.4)	(1.9)
Net increase/decrease in cash and cash equivalents	5.5	8.1

Notes to the Group Financial Statements continued

34. Related Parties

All transactions with related parties are conducted on an arm's-length basis and in accordance with normal business terms. Transactions between related parties that are Group subsidiaries are eliminated on consolidation.

The related parties identified by the Directors include joint ventures, associates and key management personnel. To enable users of our financial statements to form a view on the effects of related party relationships on the Group, we disclose the related party relationship irrespective of whether there have been transactions between the related parties.

34.1 Transactions with joint ventures and associates

All transactions with joint ventures and associates are in the normal course of business. Transactions between the Group and its associates for 2019 are £0.3m (2018: £0.3m). Transactions between the Group and its joint ventures are disclosed below:

	2019 £m	2018 £m
Sales to joint ventures	3.2	3.2
Purchases from joint ventures	25.4	28.0
Dividends received	0.1	1.2
Injection of equity funding	—	—
Trade payables owed to joint ventures	5.3	7.2
Trade receivables owed by joint ventures	0.2	0.2

Trade payables owed to joint ventures are settled net of trade receivables owed by joint ventures 60 days after the delivery of goods or services. There are no loans to and from joint ventures.

34.2 Transactions with key management personnel

There have been no transactions with key management personnel of the Group other than the Directors' remuneration.

Directors' remuneration is disclosed in Note 8 of the Group Financial Statements and in the Directors' Remuneration Report.

34.3 Transactions with other related parties

There are no controlling shareholders of the Group as defined by IFRS. There have been no material transactions with the shareholders of the Group.

Pension contributions to Group schemes are disclosed in Note 26 of the Group Financial Statements.

Other than the parties disclosed above, the Group has no other material related parties.

Company Balance Sheet

As at 31 December 2019

	Notes	2019 total £m	2018 total £m
Fixed assets			
Investment	7	1,778.0	1,778.0
Total fixed assets		1,778.0	1,778.0
Current assets			
Cash at bank and in hand		—	1.7
Debtors – amounts falling due within one year		3.6	3.3
Total current assets		3.6	5.0
Creditors – amounts falling due within one year			
Bank overdraft		(0.6)	(0.3)
Other creditors	8	(934.3)	(923.9)
Net current liabilities		(931.3)	(919.2)
Total assets less current liabilities		846.7	858.8
Net assets		846.7	858.8
Equity capital and reserves			
Issued share capital	9	27.8	27.8
Retained earnings		818.9	831.0
Total shareholders' funds		846.7	858.8

Company number 8217766

Under Section 408 of the Companies Act 2006, the Company is exempt from the requirement to present its own income statement. During 2019 the Company recognised a profit of £37.3m (2018: £260.5m profit).

The financial statements on pages 193 to 200 were approved and authorised for issue by the Directors on 27 February 2020 and signed on their behalf by:

Patrick André
Chief Executive

Guy Young
Chief Financial Officer

Company Statement of Changes in Equity

As at 31 December 2019

	Share capital £m	Retained earnings £m	Total £m
As at 1 January 2018	27.8	630.2	658.0
Comprehensive income/loss recognised for the year	—	260.5	260.5
Purchase of ESOP shares	—	(13.4)	(13.4)
Recognition of share-based payments	—	3.7	3.7
Dividend paid	—	(50.0)	(50.0)
As at 1 January 2019	27.8	831.0	858.8
Comprehensive income/loss recognised for the year	—	37.3	37.3
Recognition of share-based payments	—	4.5	4.5
Dividend paid	—	(53.9)	(53.9)
As at 31 December 2019	27.8	818.9	846.7

The Company had distributable reserves of £818.9m as at 31 December 2019 (2018: £831.0m).

Notes to the Company Financial Statements

1. General Information

Vesuvius plc ('Vesuvius' or 'the Company') is a public company limited by shares. It is incorporated and domiciled in England and Wales and listed on the London Stock Exchange. The nature of the company is a holding company. The address of its registered office is 165 Fleet Street, London EC4A 2AE.

2. Basis of Preparation

2.1 Basis of accounting

The financial statements of the Company have been prepared in accordance with Financial Reporting Standard 101 Reduced Disclosure Framework (FRS 101) and the Companies Act 2006 as applicable to companies using FRS 101. The financial statements have been prepared under the historical cost convention.

The results of the Company are included in the preceding Group Financial Statements.

In these financial statements, the Company has applied the exemptions available under FRS 101 in respect of the following disclosures:

- > A cash flow statement and related notes (IAS 1 para 10(d) and IAS 7)
- > Disclosures in respect of capital management and financial instruments (IAS 1 para 134-136 and IFRS 7)
- > Disclosures in respect of related party transactions with wholly owned members of the Vesuvius plc Group (IAS 24)
- > Disclosures in respect of the compensation of key management personnel (IAS 24 para 17)
- > Disclosures in respect of fair value measurements (IFRS 13 para 91-99)
- > The effects of new but not yet effective IFRSs (IAS 8 para 30-31)

Under Section 408 of the Companies Act 2006, the Company is exempt from the requirement to present its own profit and loss account.

The accounting policies set out below have, unless otherwise stated, been applied consistently to all periods presented in these financial statements.

2.2 Going concern

The Directors have a reasonable expectation that the Group and the Company have adequate resources to continue in operational existence for a period of at least 12 months from the date of approval of these financial statements. The net current liabilities are due to amounts owed to subsidiary undertakings, therefore the Directors do not believe that they will affect the Company's ability to continue in operational existence. Accordingly, they continue to adopt a going concern basis in preparing the financial statements of the Group and the Company.

2.3 Accounting policy

Taxation

Both current and deferred tax are calculated using tax rates and laws that have been enacted, or substantively enacted, by the balance sheet date.

Current tax payable is based on the taxable result for the year. Deferred taxation is recognised, without discounting, in respect of all temporary differences that have originated, but not reversed, at the balance sheet date, with the exception that deferred taxation assets are only recognised if it is considered more likely than not that there will be suitable future profits from which the reversal of the underlying temporary differences can be deducted. Provision is made for the tax that would arise on remittance of the retained earnings of overseas subsidiaries only to the extent that, at the balance sheet date, dividends have been accrued as receivable. All other accounting policies are set out within the respective notes.

Notes to the Company Financial Statements continued

3. Critical Accounting Judgements and Estimates**Impairment of Investment in subsidiaries and other companies (Estimate and Judgement)**

The Company assesses its investments in subsidiaries and other companies for impairment shortly before the Company's year-end or whenever events or changes in circumstances indicate that the recoverable amount of the investment could be less than the carrying amount of the investment. If this is the case, the investment is considered to be impaired and is written down to its recoverable amount. Judgement is required in the determination of the recoverable amount as the Company evaluates various factors related to the operational and financial position of the relevant investee business, appropriate discounting and long-term growth rates. The annual investment impairment test is described in Note 7.3 below.

4. Employee Benefits Expense

	2019 £m	2018 £m
Wages and Salaries	2.4	3.4
Social security costs	0.5	0.7
Share-based payments	1.3	1.2
Compensation for loss of office	—	—
Pension costs – defined contribution pension plans	—	—
Total employee benefits expense	4.2	5.3

The total average number of employees for 2019 was 3 (2018: 3). As at 31 December 2019, the Company had 3 (2018: 3) employees.

Details of the Directors' remuneration are disclosed in the Directors' Remuneration Report on page 117.

5. Audit and Non-Audit Fees

Amounts payable to PricewaterhouseCoopers LLP in relation to audit and non-audit fees are disclosed within Note 6 to the Group Financial Statements.

6. Dividends

A final dividend for the year ended 31 December 2018 of £37.2m (2017: £33.8m), equivalent to 13.8 pence (2017: 12.5 pence) per ordinary share, was paid in May 2019 (May 2018) and an interim dividend for the year ended 31 December 2019 of £16.7m (2018: £16.2m), equivalent to 6.2 pence (2018: 6.0 pence) per ordinary share, was paid in September 2019 (September 2018).

A proposed final dividend for the year ended 31 December 2019 of £38.6m, equivalent to 14.3 pence per ordinary share, is subject to approval by shareholders at the Company's Annual General Meeting and has not been included as a liability in these financial statements. If approved by shareholders, the dividend will be paid on 22 May 2020 to ordinary shareholders on the register at 17 April 2020.

7. Investment in Subsidiaries, Associates and Joint Ventures

7.1 Accounting policy

Shares in subsidiaries, associates and joint ventures are stated at cost less any impairment in value. Impairment is assessed in accordance with Note 17.1 to the Group Financial Statements.

7.2 Analysis of investment in subsidiaries, associates and joint ventures

	Shares in subsidiaries £m
As at 1 January 2019 and 31 December 2019	1,778.0

The subsidiaries, joint ventures and associates of Vesuvius plc, their country of incorporation and percentage ownership is set out in Note 33 to the Group Financial Statements. With the exception of Vesuvius Holdings Ltd, whose ordinary share capital was directly held by Vesuvius plc, the ordinary share capital of the other companies was owned by a Vesuvius plc subsidiary as at 31 December 2019.

7.3 Impairment of Investment in Subsidiaries, Associates and Joint Ventures

The Group carried out its annual investment impairment test as at 31 October 2019. The recoverable amount of the investment significantly exceeded its carrying value, therefore no impairment charges have been recognised. The recoverable amount of the investment was also checked against its carrying value as at 31 December 2019 and no impairment triggers were identified.

The cash flow predictions are based on financial budgets and strategic plans approved by the Board. These assume a level of revenue and profits which are based on both past performance and expectations for future market development and take into account the cyclical nature of the business in which the Group operates. Cash flows beyond the period of the strategic plans are extrapolated in perpetuity using a long term growth rate of 2.5% (2018: 2.5%). The key assumptions and methodology in determining the value in use of the Group are disclosed in Note 17.3 to the Group Financial Statements. The sensitivity of the forecasts to a reasonably possible change in certain assumptions which might require an impairment in 2020 was considered. A reduction in the Group's trading profit of 20% over the next 3 years would result in an impairment of £81m.

8. Other Creditors

	2019 £m	2018 £m
Amounts owed to subsidiary undertakings	933.0	921.7
Accruals and other creditors	1.3	2.2
Total amounts falling due within one year	934.3	923.9

Amounts owed to subsidiary undertakings are interest free, have no fixed date of repayment and are repayable on demand.

9. Issued Share Capital

9.1 Accounting policy

Equity instruments issued by the Company are recorded at the proceeds received, net of direct issue costs.

9.2 Analysis of issued share capital

The issued and fully paid ordinary share capital of the Company as at 31 December 2019 was 278,485,071 shares of £0.10 each (2018: 278,485,071 shares of £0.10 each). 7,271,174 (2018: 7,271,174) shares of £0.10 each were held in Treasury and 1,718,615 (2018: 2,874,060) shares of £0.10 each were held by the Vesuvius Group employee share ownership plan trust (ESOP). The Company has one class of shares in issue, ordinary shares. All shareholders enjoy the same rights in relation to these shares, including rights in relation to voting at General Meetings of the Company, distribution of dividends and repayment of capital.

Notes to the Company Financial Statements continued

10. Share-based Payments

10.1 Accounting policy

The Company operates equity-settled share-based payment arrangements for its employees. Equity-settled share-based payments are measured at fair value at the date of grant. For grants with market-based conditions attached to them, such as total shareholder return, fair value is measured using a form of stochastic option pricing model. For grants with non-market-based conditions, such as growth in headline earnings per share, fair value is measured using the Black-Scholes option pricing model. The fair value is expensed on a straight-line basis over the vesting period with a corresponding increase in equity. The cumulative expense recognised is adjusted for the best estimate of the shares that will eventually vest.

10.2 Profit and loss account recognition

The Company operates a number of different share-based payment schemes, the main features of which are detailed in the Directors' Remuneration Report. A total of £1.3m was charged to the profit and loss account in the year with regard to share-based payments (2018: £1.2m).

10.3 Details of outstanding options

	Outstanding awards					Awards exercisable as at 31 Dec 2019 no.	Weighted average outstanding contractual life of awards years	Range of exercise prices pence
	As at 1 Jan 2019 no.	Granted no.	Exercised no.	Forfeited/lapsed no.	Expired no.	As at 31 Dec 2019 no.		
LTIP	968,965	327,560	(423,788)	—	—	872,737	7.4	n/a
Weighted average exercise price	nil	nil	nil	nil	nil	nil	—	n/a
Other plans	28,246	48,674	—	—	—	76,920	1.2	n/a
Weighted average exercise price	nil	nil	nil	nil	nil	nil	—	n/a

For options exercised during 2019, the market value at the date of exercise was 613 pence.

	Outstanding awards					Awards exercisable as at 31 Dec 2018 no.	Weighted average outstanding contractual life of awards years	Range of exercise prices pence
	As at 1 Jan 2018 no.	Granted no.	Exercised no.	Forfeited/lapsed no.	Expired no.	As at 31 Dec 2018 no.		
LTIP	934,918	301,901	(117,051)	(150,803)	—	968,965	5.7	n/a
Weighted average exercise price	nil	nil	nil	nil	nil	nil	—	n/a
Other plans	—	28,246	—	—	—	28,246	2.2	n/a
Weighted average exercise price	nil	nil	nil	nil	nil	nil	—	n/a

For options exercised during 2018, the market value at the date of exercise ranged from 568 pence to 581 pence.

Details of market performance conditions are included in the Directors' Remuneration Report.

As at 31 December 2019, the total options exercisable by all Group employees over the £0.10 ordinary shares and capable of being satisfied through new allotments of shares or through shares held by the Company's ESOP were as follows:

	Years of award/grant	Option prices	Latest year of exercise/ vesting	Number of options/ allocations outstanding
Long-Term Incentive Plan	2017-2019	nil	2029	1,833,220
Medium Term Incentive Plan	2018-2019	nil	2021	608,179
Deferred Share Bonus Plan	2018-2019	nil	2021	76,920

Fair value of options granted under the LTIP during the year:

	2019	
	EPS element	TSR element
Fair value of options granted	£1,932,431	£1,204,591
Share price on date of grant	608p	608p
Expected volatility	n/a	30.6%
Risk-free interest rate	n/a	0.9%
Exercise price (per share)	nil	nil
Expected term (years)	3	3
Expected dividend yield	nil	nil

Vesting of 50% of shares awarded is based on the Group's three-year TSR performance relative to that of the constituent companies of the FTSE 250 (excluding investment trusts) and vesting of the remaining 50% of shares awarded is based on headline EPS growth.

Expected volatility was determined by calculating the historical volatility of the Group's share price over the 2.8 years (2018: 2.8 years) prior to the grant date for the March 2019 grant. The risk-free rate of return was assumed to be the yield to maturity on a UK fixed gilt with the term to maturity equal to the expected life of the option. At the discretion of the Remuneration Committee, award holders receive the value of dividends that would have been paid on their vested shares in the period between grant and vesting. Accordingly, there is no discount to the valuation for dividends foregone during the vesting period.

11. Contingent Liabilities

Where the Company enters into financial guarantee contracts to guarantee the indebtedness of other companies within its Group, the Company considers these to be insurance arrangements and accounts for them as such. In this respect, the Company treats the guarantee contract as a contingent liability until such time as it becomes probable that the Company will be required to make a payment under the guarantee. Guarantees provided by the Company as at 31 December 2019 in respect of the liabilities of its subsidiary companies amounted to £419.4m (2018: £605.2m), which includes guarantees of \$200.0m and €130.0m (2018: \$200.0m and €130.0m) in respect of US Private Placement Loan Notes and £125.8m (2018: £180.8m) in respect of drawings under the syndicated bank facility; together with £32.9m (2018: £150.8m) in relation to a guarantee provided to the Company's UK subsidiary which acts as Trustee for the Group's UK pension plan. The guarantee is over all present and future pension liabilities of the plan and the contingent liability amount represents the net deficit on a buy-out basis as shown in the most recent triennial valuation.

Vesuvius has extensive international operations and is subject to various legal and regulatory regimes, including those covering taxation and environmental matters. Several of the Company's subsidiaries are parties to legal proceedings, certain of which are insured claims arising in the ordinary course of the operations of the company involved, and are aware of a number of issues which are, or may be, the subject of dispute with tax authorities. Whilst the outcome of litigation and other disputes can never be predicted with certainty, having regard to legal advice received and the insurance arrangements of the Company and its subsidiaries, the Directors believe that none of these matters will, either individually or in the aggregate, have a materially adverse effect on the Company's financial condition or results of operations.

Notes to the Company Financial Statements continued

12. Related Parties

All transactions with related parties are conducted on an arm's-length basis and in accordance with normal business terms. Transactions between related parties that are wholly owned Company subsidiaries are not disclosed in this Note.

The related parties identified by the Directors include joint ventures, associates and key management personnel. To enable users of our financial statements to form a view on the effects of related party relationships on the Company, we disclose the related party relationship when control exists, irrespective of whether there have been transactions between the related parties.

Transactions with joint ventures and associates

All transactions with joint ventures and associates are in the normal course of business. Further details of joint ventures and associates are included in Note 33 to the Group Financial Statements.

Transactions with key management personnel

There have been no transactions with key management personnel of the Company other than the Directors' remuneration.

Directors' remuneration is disclosed in the Annual Report on Directors' Remuneration.

Transactions with other related parties

There are no controlling shareholders of the Company as defined by IFRS. There have been no material transactions with the shareholders of the Company.

Pension contributions are disclosed in Note 26 to the Group Financial Statements.

Other than the parties disclosed above, the Company has no other material related parties.

Five-Year Summary: Divisional Results from Continuing Operations

		2019	2018	2017	2016	2015
Steel Division						
Revenue	£m	1,195.3	1,236.7	1,148.7	942.0	897.6
Trading profit	£m	120.1	128.3	100.4	79.2	79.5
Return on sales	%	10.0	10.4	8.7	8.4	8.9
Employees: year-end	no.	7,677	7,766	7,930	7,782	7,783
Foundry Division						
Revenue	£m	515.1	561.3	535.2	459.4	424.4
Trading profit	£m	61.3	68.9	65.1	54.1	44.5
Return on sales	%	11.9	12.3	12.2	11.8	10.5
Employees: year-end	no.	2,819	3,043	3,080	3,058	3,129

Shareholder Information (unaudited)

Enquiries

The share register is managed by Equiniti, who can be contacted if you have any Vesuvius shareholding queries.

Equiniti Limited
Aspect House, Spencer Road
Lancing, West Sussex, BN99 6DA
United Kingdom

Telephone*
0371 384 2335 (UK only)
+44 121 415 7047 (Outside the UK)

Website www.shareview.co.uk

For the hard of hearing, Equiniti offers a Textel service which can be accessed by dialling 0371 384 2255 (or +44 121 415 7028 if calling from outside the UK).

Any shareholder enquiries not related to the share register should be sent by email to shareholder.information@vesuvius.com or by letter to the Company Secretary at the registered office.

Registered Office and Group Head Office

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Registered in England & Wales No. 8217766
LEI: 213800ORZ521W585SY02

Vesuvius Website

Shareholder and other information about the Company, including details of the current and historic share price, can be accessed on the Vesuvius website, www.vesuvius.com.

Shareview and Electronic Communication

Equiniti's website, www.shareview.co.uk, enables shareholders to access details of their shareholdings online. The website provides answers to frequently asked questions and information useful for the management of investments. To access online information on your shareholding, you will require your shareholder reference number, which can be found at the top of your share certificate or dividend confirmation.

Shareholders can register to receive shareholder communications electronically, including the Company's Annual Report and Financial Statements, rather than in paper form, using Shareview. The registration process requires shareholders to input their shareholder reference number. To receive shareholder communications in electronic form, shareholders should select 'email' as their mailing preference. Once registered, shareholders will receive an email notifying them each time a shareholder communication has been published on the Vesuvius website.

Share Dealing Service

The Company's shares can be traded through most banks, building societies or stockbrokers. UK resident shareholders can also buy and sell shares online or by telephone using Equiniti's Shareview dealing service by either logging on to www.shareview.co.uk/dealing or by calling 0345 603 7037 between 8.00 am and 4.30 pm on any business day (excluding public holidays in England and Wales). The shareholder reference number (found at the top of your share certificate or on your dividend confirmation) is required to use the dealing service.

ShareGift

ShareGift, the charity share donation scheme, is a free service for shareholders wishing to give shares to charitable causes. It is particularly useful for those shareholders who may wish to dispose of a small quantity of shares where the market value makes it uneconomic to sell on a commission basis. Further information can be obtained from ShareGift's website at www.sharegift.org; telephone +44 (0)20 7930 3737; or by emailing help@sharegift.org.

Dividend Reinvestment Plan

Equiniti offers a dividend reinvestment plan, through which shareholders can use any cash dividends declared to buy additional shares in Vesuvius. Further details, including how to sign up, and the terms and conditions of the plan, are available on Equiniti's website, www.shareview.co.uk or by calling the Share Dividend Helpline on 0371 384 2268 (or +44 121 415 7173 if calling from outside the UK).

Overseas Payment Service

Equiniti provides a dividend payment service in over 90 countries that automatically converts payments into local currency and pays the funds into a shareholder's bank account. Further details, including an application form and the terms and conditions of the service, are available on www.shareview.co.uk or from Equiniti by calling +44 (0)121 415 7047 or writing to Equiniti, Aspect House, Spencer Road, Lancing, West Sussex, BN99 6DA, United Kingdom (please quote Overseas Payment Service, the Company's name and your shareholder reference number).

Financial Calendar

2020 Annual General Meeting	13 May 2020
Announcement of 2020 half-year results	30 July 2020

* Lines are open Monday to Friday 8.30 am to 5.30 pm (excluding public holidays in England and Wales).

Analysis of ordinary shareholders

As at 31 December 2019	Investor type		Total	Shareholdings			
	Private	Institutional and other		1–1,000	1,001–50,000	50,001–500,000	500,001+
Number of holders	2,439	559	2,998	2,333	445	147	73
Percentage of holders	81.35%	18.65%	100%	77.83%	14.84%	4.90%	2.43%
Percentage of shares held	0.45%	99.55%	100%	0.12%	1.21%	8.90%	89.77%

Share Fraud – Spot the Warning Signs

Investment scams are designed to look like genuine investments.

Have you been...

- > Contacted out of the blue
- > Promised tempting returns and told the investment is safe
- > Called repeatedly
- > Told the offer is only available for a limited time?

If so, you might have been contacted by fraudsters.

How to Avoid Share Fraud

1. Reject cold calls

If you have been contacted by telephone, email or post, or via a third party or at a seminar or exhibition, with an offer to buy or sell shares, the chances are that it's a high-risk investment or a scam. You should treat any offer with extreme caution. The safest thing to do is to ignore the approach and if you were contacted by phone to hang up on the call.

2. Check if the firm is authorised by the Financial Conduct Authority (FCA) and recorded on the Financial Services register at <https://register.fca.org.uk/>

The Financial Services Register is a public record of all the firms and individuals in the financial services industry that are, or have been, regulated by the Prudential Regulation Authority and/or the FCA.

3. Get impartial advice

Think about getting impartial financial advice before you hand over any money. Seek advice from someone unconnected to the firm that has approached you.

Reporting a Scam

If you suspect that you have been approached by fraudsters please tell the FCA by contacting them on 0800 111 6768 (or +44 20 7066 1000 from outside the UK) or by using the share fraud reporting form at www.fca.org.uk/scams, where you can find out more about investment scams.

If you have lost money to investment fraud, you should report it to Action Fraud on 0300 123 2040 or online at www.actionfraud.police.uk.

Find out more at www.fca.org.uk/scamsmart.

Glossary

5S	Five Steps to improve housekeeping and therefore workplace safety and efficiency: separate, sort, shine, standardise and sustain
8D	Eight Disciplines: an eight-step methodology to resolve customer, supplier and internal quality issues
AGM	Annual General Meeting
CO₂	Carbon dioxide
CO₂e	Carbon dioxide equivalent
Code	The UK Corporate Governance Code
Company	Vesuvius plc
DSBP	Deferred Share Bonus Plan
DTR	The Disclosure and Transparency Rules of the UK Financial Conduct Authority
EBITDA	Trading profit before depreciation and amortisation of non-acquired intangible charges
EMEA	Europe, Middle East and Africa
EPS	Earnings per share
EU	European Union
FRC	Financial Reporting Council
FRS	Financial Reporting Standards
FTSE 250	Equity index whose constituents are the 101st to 350th largest companies listed on the London Stock Exchange in terms of their market capitalisation

FX	Foreign exchange
GHG	Greenhouse gas
Group	Vesuvius plc and its subsidiary companies
IAS	International Accounting Standard
IFRS	International Financial Reporting Standards
KPI	Key Performance Indicator
LTI	Lost time injury
LTIFR	Lost time injury frequency rate, a KPI which calculates the number of LTIs per million hours worked
Median	The middle number in a sorted list of numbers
NAFTA	The area to which the North American Free Trade Agreement applies
Ordinary share	An ordinary share of 10 pence in the capital of the Company
R&D	Research and development
TSR	Total shareholder return
Turbo S	The Vesuvius safety training programme
UK GAAP	UK Generally Accepted Accounting Principles
VSP	Vesuvius Share Plan

Photographed by Samuel Dhote, the portraits featured in this Annual Report celebrate the Vesuvius team from our locations around the world.

Photographs

P4:

Photographer – Yousef Mohassab

Collaborators – Ray Samarin & Craig Dalessandris

P61:

Photographer – Kyle DeBruyn

Collaborator – Mark McClain

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